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U. S. ARMY LAND WARFARE LABORATORY. VOLUME I. PROJECT REPORT, APPENDIX A. DOCUMENTATION

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FOREWORD

During the late 50's and early 60's, there was a noticeable increase in the incidents of subversive insurgency throughout the world. The U. S. Army found that despite its arsenal of modern materiel of war, troops were not always prepared to meet the specialized requirements that arose in counter-insurgency. Additionally, specialized equipment was often needed to fight this type of war, and it was needed quickly by the man in the field.

It was to meet this need that the U. S. Army Limited War Laboratory (LWL) was conceived and activated. The Laboratory was designed to emphasize close liaison with troops in the field, a multidisciplinary approach to their wide variety of problems, a quick response to those problems, and an intense interest in the welfare of the individual soldier.

This final project report tells the story of how LWL, which was a unique Laboratory in many ways, strove to meet these goals throughout its 12 years of existence. It is a story worth telling and worth preserving. Should the necessity for a specialized facility arise again, the LWL story will provide a blueprint for those planning the new organization. Included here are details of the original planning, the organizational concept and its evolution, a description of facilities, the management and operational philosophies, sources of funding, and a description of program development and execution. The advantages and limitations of LWL's organization and operation are discussed frankly and lessons learned from its operation are reviewed. The Appendices provide full documentation of LWL's development and summaries of the majority of the tasks undertaken during LWL's lifetime.

Every attempt has been made to keep this from being a dry, statistical report. LWL was unique in its concept and was a lively, exciting operation throughout its existence. It is impossible to write about its operation without absorbing some of the flavor of this enthusiasm. LWL was unique, it was exciting, and it was able to react to problems in a way other laboratories could not. Someday one might hope a book will be written about the place and the people who worked there. In the meantime, this report fills an important chapter in the history of Army research and development.

PREFACE

This project was performed by Battelle's Columbus Laboratories (BCL) for the U. S. Army Land Warfare Laboratory (LWL), Aberdeen Proving Ground, Maryland, under Contract No. DAAD05-74-C-0771. Mr. P. M. Anderson of LWL was the Technical Monitor, and Mr. J. Tuck Brown of BCL was the Program Director.

Battelle wishes to express its appreciation to Mr. Anderson for his contributions to this Final Project Report on LWL. Due to his lengthy association with LWL and his interest in setting down for the record a full accounting of the U. S. Army Land Warfare Laboratory, Mr. Anderson provided invaluable assistance to the BCL researchers in the gathering of their documentation, recalling from his own experiences information necessary to complete the report. The comments and assistance of Col. Richard L. Clarkson and Dr. Russell D. Shelton, Commanding Officer and Technical Director during LWL's final years, were also vital in assuring the completeness and accuracy of this document.

The Final Project Report has been divided into two volumes:

Volume I. Project Report and Appendix A, Documentation
Volume II. Appendix B, Task Sheets

DISCLAIMER

The findings in this report are not to be construed as an official Department of the Army position. Neither does the citation of any items by trade name constitute official endorsement or approval by the Department of the Army of the use of such commercial items.

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FINAL PROJECT REPORT -
U. S. ARMY LAND WARFARE LABORATORY

by

J. E. Mortland, M. Cutler, and
E. K. Kaprelian

BACKGROUND

In the early 1960's it had become apparent that a nuclear standoff existed between the two super powers rendering unlikely a planned nuclear war. Historically, U. S. military doctrine, training, and equipment reflected the primary objective of being prepared to fight in Northern Europe. Accordingly, most U. S. doctrine, training, and equipment were directed at countering potential enemy capabilities in that environment or exploiting U. S. capabilities there. However, during the above period, warfare of a third dimension, viz., guerrilla insurgency, loomed increasingly large as a threat to world peace. The U. S. Army, fully aware of the situation, undertook a number of actions to cope with it. One of these was the activation of the U. S. Army Limited War Laboratory (LWL)* at Aberdeen Proving Ground, Maryland, on 15 June 1962. A copy of the activation letter is included as Exhibit I, Appendix A.

This new organization was established as a Class II activity, under the command of the U. S. Army Office of the Chief of Research and Development (OCRD), for the purpose of quickly providing U. S. forces in the field with new and improved materiel for limited warfare operations, particularly those pertaining to counterinsurgency and guerrilla warfare. Unlike other Army research and development laboratories, which were assigned initially to the Technical Services and later to the U. S. Army Materiel Command (AMC), LWL was intended to report directly to OCRD. This shortened chain of command was designed to enhance the quick-reaction capability of LWL.

The idea of an R&D organization working directly with troops in the field, and producing hardware on a quick-reaction basis was a revolutionary approach to materiel problems. The degree of emphasis placed by LWL on

*Since redesignated Land Warfare Laboratory as discussed later in the report.

maintaining close liaison with the field fostered the development of an intense interest in the welfare of the individual soldier. Upon activation, LWL was quickly organized to fulfill this unique role and during the next 10 years was deeply engrossed in responding to the needs of U. S. Forces in Southeast Asia. As the level of combat decreased and finally wound down completely, the role of LWL was reviewed with increasing frequency. Finally, on 4 February 1974, it was announced that the Laboratory would be deactivated, effective 30 June 1974. (The deactivation letter is included as Exhibit 2, Appendix A.) This is the final report on LWL's 12 years of R&D activity.

The U. S. Army Limited War Laboratory Planning Group

Once the need for research to develop a capability in unconventional warfare was recognized, the establishment of LWL proceeded quickly. On 7 March 1962, the Army Chief of Staff approved steps to initiate the establishment of the U. S. Army Limited War Laboratory. In order to accomplish the detailed planning required prior to establishing the Laboratory, the U. S. Army Limited War Laboratory Planning Group was organized. This group, acting under the auspices of the Director of Developments, OCRD, included

- LTC Joseph Tuck Brown, Chairman
- LTC George Sammett, Jr.
- Dr. Carl Lamanna
- Mr. Victor Lindner
- Mr. Joseph F. Petit
- Mr. Edward K. Kaprelian.

The Planning Group was responsible for

(1) Selecting the installation at which the Laboratory was to be established, including a statement of the facilities required.

(2) Preparing recommended detailed statements of missions and functions of the laboratory

(3) Recommending civilian personnel to serve as Technical Director and Assistant Technical Director*

(4) Preparing recommendations for the organization of the Laboratory, including staffing and statement of functions of subordinate elements

(5) Effecting the necessary coordination within OCRD and the Army staff of actions relating to the establishment of the Laboratory

(6) Initiating and coordinating the necessary action to effect the establishment of the Laboratory, as approved, on or about 15 June 1962.

Site Survey and Selection

Twenty military installations were identified by the Planning Group at their first meeting on 23 April 1962, as potential sites for the new laboratory. Following a lengthy discussion concerning the assets and liabilities of those installations under consideration, the list was reduced to ten locations that might possibly meet the requirements for the new facility. A final determination was delayed pending a visit to these ten installations by the Planning Group.

Those installations to be visited were contacted by the Planning Group and an itinerary prepared for the period 26 April through 9 May 1962. May 14 was selected as the target date for site selection. A check list (see Figure 1) was prepared for use by the Group in evaluating the installations visited.

None of the installations visited completely met the requirement for the early establishment of the laboratory, i.e., 15 June 1962. Of those visited, Aberdeen Proving Ground and Frankford Arsenal provided the majority of the elements necessary, and far surpassed those which could be provided by any other installations considered. Both facilities expressed a strong interest in having

*The latter position was carried on the initial Table of Distribution and on early organization charts, but was never filled and was subsequently removed from the organization.

USALWL SITE EVALUATION

Installation: _____ Date: _____

Factor	Rating
Professional Competence On Site Neighboring Installations Non-Government	
Diversity of Disciplines On Site Neighboring Installations Non-Government	
Installation Image Receptiveness Progressiveness	
Availability of Building & Grounds Currently Available Office Space Currently Available Laboratory Space Building Conversion Cost Expansion Potential Available Housekeeping	
Availability of Supplementary Competencies: Special Fabrication Facilities Electronics ( ) On Site ( ) ( ) Within 50 miles Explosives ( ) " " ( ) " " " Shops ( ) " " ( ) " " " Chemistry ( ) " " ( ) " " " Biology ( ) " " ( ) " " " Other ( ) " " ( ) " " " Non-Fabrication Facilities Library ( ) On Site ( ) Other Local Computer ( ) " " ( ) " "	
Availability of Test Areas Explosives ( ) On Site ( ) Within 50 miles Firing Range ( ) " " ( ) " " " Electronic ( ) " " ( ) " " " Drop Area & Landing Strip ( ) " " ( ) " " " Diversity of Terrain ( ) " " ( ) " " " Absence of Zoning Restrictions ( ) " " ( ) " " "	
Housing Conditions Availability of Homes Environmental Factors	
Accessibility & Travel Convenience Availability of Public Transportation Travel Time from Metropolitan Area	
Proximity to University Community	
Other Comments	
Ratings: Excellent - E Good - G Fair - F Unsatisfactory - U RATER: _____	

FIGURE 1. CHECK LIST USED IN SITE SURVEY

the new laboratory located within their installation. Certain other installations were less than enthusiastic. On 11 May 1962, the Planning Group directed its recommendation to the Chief, Research and Development, that Aberdeen Proving Ground (APG) be approved as the site of the Limited War Laboratory. The letter from Colonel Brown recommending APG as the LWL site and a letter approving this site, signed by General Arthur Trudeau, are included as Exhibits 3 and 4, Appendix A.

MISSION

The mission of the U. S. Army Limited War Laboratory as written by the Planning Group was:

> "to provide a centralized research and development activity responsible for meeting Army operational requirements relating to limited war, particularly to war of low intensity in underdeveloped or remote areas of the world. This includes specifically the provision of a quick-reaction facility for accomplishing short-range developments of specialized limited warfare items. It conducts research and development leading to the provision of new items and techniques in the use of materials to improve the effectiveness of military personnel committed to limited warfare actions."

The mission remained essentially the same throughout LWL's lifetime, although in later years the mission statement was shortened to read:

> "to provide a centralized quick-reaction research and development facility for accomplishing development of specialized military items and for the generation of new ideas for such material."

In fulfilling its mission, the Laboratory's functions included:

- Providing a quick-reaction capability in terms of techniques or equipment responsive to assigned requirements related to its mission. (The capabilities of existing Army R&D installations, as well as those of industry, were utilized to supplement the in-house facilities of the Limited War Laboratory in the development and fabrication of special items.) Implicit to this function was that LWL would seek the best possible solution available in a limited period (6 to 18 months), not an ultimate or optimum solution. The latter would be left to other Army laboratories for long-range development.

- Acting as the materiel and equipment counterpart of the Remote Area Conflict Office, U. S. Army Combat Developments Command; providing close liaison with field installations and with users, and assessing field requirements in terms of present and foreseeable technology.

- Generating new ideas for materiel, with special emphasis on interdisciplinary approaches; examining their technical

feasibility and referring them to appropriate agencies for the generation of formal requirements and subsequent development.

- Serving as the centralized point for advancing the technology of limited war through cognizance of existing R&D programs, disseminating information relating to such programs, coordinating related efforts at U. S. Army R&D installations, providing a point of contact with industry and the other Services, and within the scope of its mission, evaluating new ideas, projects, and proposals.
- Acting as a stimulus for increasing R&D activities related to the development of materiel for limited warfare purposes.
- Developing expedient solutions to materiel problems by using resources available in the natural environment or by modification of previously issued materiel.
- Performing studies, applied research, and exploratory development in line with its mission.
- Maintaining a continuing and current knowledge of the various scientific disciplines and engineering skills related to its mission.

The remainder of this report will explore exactly how LWL functioned in these many areas.

ORGANIZATION AND PERSONNEL

As the LWL organization grew through the years to meet new requirements, the organizational framework necessarily underwent a series of changes. However, this evolutionary process went practically full circle so that the final basic framework of LWL was largely unchanged from the original, certainly a tribute to the foresight and planning that went into establishment of the Laboratory.

Initial Table of Distribution

Considering the LWL mission, it was evident that LWL had to be structured to emphasize the following capabilities:

- The ability to respond straightforwardly and quickly
- The ability to respond to a wide variety of needs
- The dedication to close liaison with the field and an intense interest in the welfare of the individual soldier.

It was readily apparent to the original planners that the wide scope of R&D involved in meeting the problems related to operational requirements for limited warfare in remote areas would require a laboratory with a multidisciplinary capability. This would enable the laboratory to look at a particular problem from all perspectives and analyze possible approaches without any built-in bias to any one approach because of Laboratory orientation. The weight of different disciplines could also be brought to bear on different aspects of a problem. These were things that could not be accomplished so easily at other U. S. Army laboratories, which were generally oriented to a specific functional or technical area. The multidisciplinary capability was essential for quick reaction to a broad range of problems.

It was recognized early that the Laboratory would meet resistance from some established Army laboratories into whose areas LWL could be expected to infringe. Nevertheless, the Chief, Research and Development, specifically included in the LWL organization a series of technical branches roughly relatable to the Army's major technical areas. This gave LWL the necessary

multidisciplinary capability under one roof. The LWL branches and their approximate relationship to the major technical areas of the Army were as follows:

Army Technical Area	LWL Organization
Ordnance Corps	Munitions Branch
Signal Corps	Communications/Electronics Branch
Chemical Corps	Chemical and Explosives Research Branch
Quartermaster Corps	Environment & Survival Branch
Transportation Corps	Mobility Branch
The Corps of Engineers	Electronics Research Branch
The Surgeon General	Biological Research Branch

A second consideration in planning the original organization was to keep the chain of command as short as possible. As LTC George Sammet so aptly stated at the time "Doing R&D doesn't take long. Only decision making takes time." If the Laboratory was to react quickly to field problems, the decision-making process had to be quick. As noted, one factor in accomplishing this was having LWL report directly to OCRD. Another was keeping the chain of command within LWL as short as possible. Organizationally, the engineer doing the work was placed as close as possible to the Commanding Officer and the Technical Director.

The seven operating LWL branches were incorporated into two technical divisions among LWL's original four divisions. This divisional setup, shown in Figure 2, was designed to facilitate the multidisciplinary approach as well as decision making, while also providing practical application based on the operational experience of assigned military personnel. Supporting these divisions were a commanding officer, a technical director, and an executive office responsible for overall administrative functions. The commanding officer was directly responsible to OCRD for efficient and effective utilization of all Laboratory resources. The Technical Director was responsible for technical planning, coordination, and execution of the Laboratory program. The original organization chart called for six officers and seventy civilians.

There was a smooth transition from Planning Group to Laboratory due to personnel selections as follows:

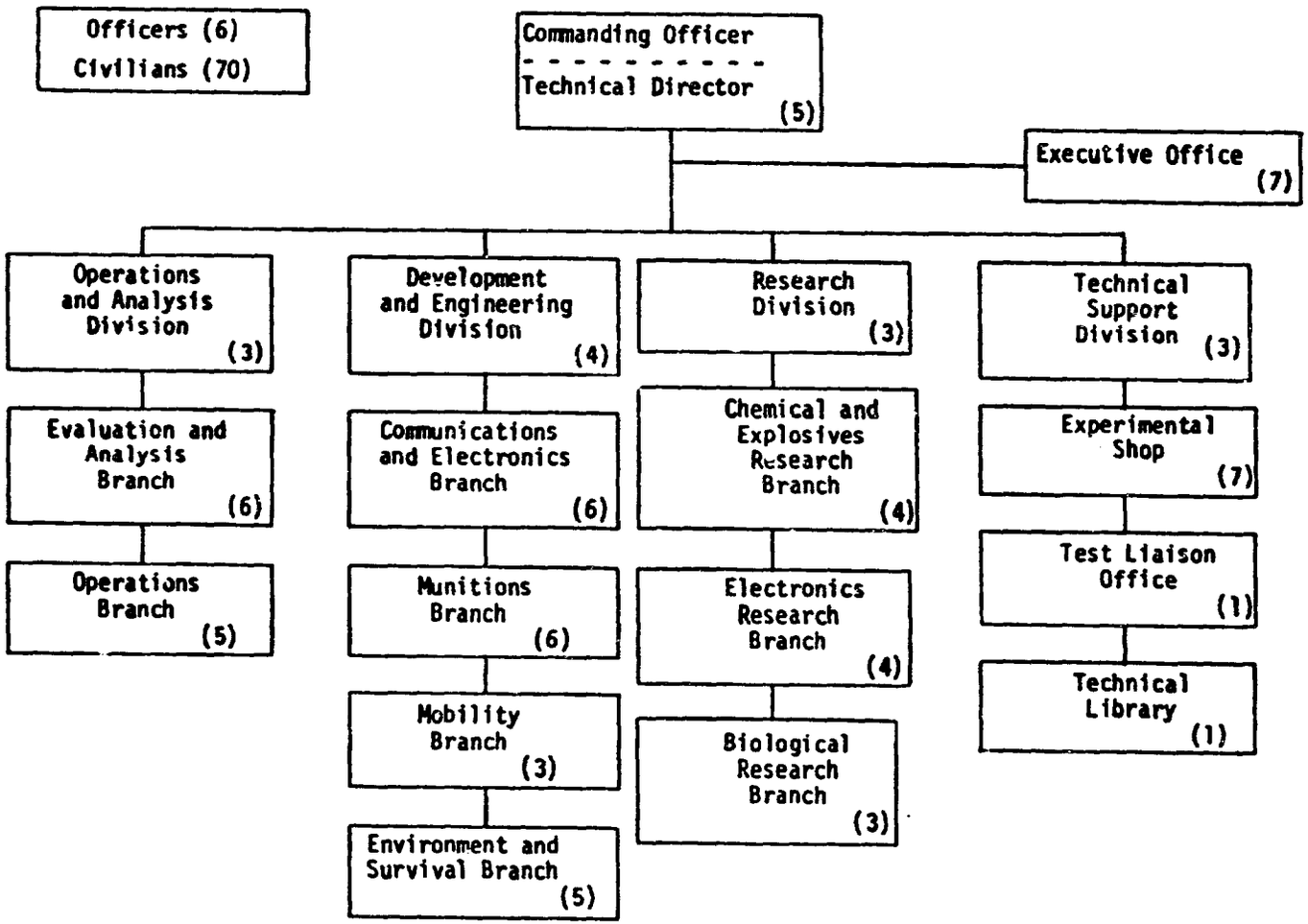


FIGURE 2. THE ORIGINAL ORGANIZATIONAL CONCEPT FOR THE U. S. ARMY LIMITED WAR LABORATORY

(The numbers in the lower-right-hand corner of each box indicate original authorized staffing of that element.)

- Col. Sterling C. Holmes designated to become the Commanding Officer of LWL was appointed Chairman of the LWL Planning Group as of May 21.
- Mr. Edward K. Kaprelian of the Planning Group was selected as Technical Director of LWL.
- LTC Joseph Tuck Brown of the Planning Group was selected as Chief of the Operations and Analysis Division.

The burden of staffing LWL after its activation fell upon Colonel Holmes, the first Commanding Officer, and Mr. Kaprelian, Technical Director. Colonel Holmes came from Redstone Arsenal, where he had been Chief of Research and Industrial Relations, and Mr. Kaprelian from Army Signal Research and Development Laboratories, Fort Monmouth, where he had been Deputy Director of Research. Both men were well prepared to assume the demanding task of establishing and developing this unique facility. By 31 December 1962, after 6 months of operation, they had filled 4 of the officer slots and 49 civilian slots. Thirty-five research tasks, selected from some 130 proposed requirements, were already underway. The ability to make such a quick start and to generate and evaluate valid requirements so quickly was due in large part to the sound organizational approach taken. However, the personalities and capabilities of the two men at the top and the enthusiasm they generated in the new Laboratory certainly cannot be discounted.

The detailed functions and operations of each of the major elements in the organization are discussed in detail in the Activation Plan (Exhibit 5, Appendix A). A summary of the missions and functions of each operating division and the Executive Office follows.

Executive Office

The Executive Office was given responsibility for direction and control of internal administration. This function included responsibility for facilities, safety, budgets, contracts, personnel, security, and planning. This Office was also responsible for evaluating management and organizational concepts and for recommending appropriate changes. The primary objective was to permit the engineers and scientists in the technical divisions to devote full energies to

technical problems by minimizing their administrative burden. By concentrating administration and much operating activity in one office, substantial duplication of staff and effort could be avoided. When problems arose in these areas, solutions were usually more quickly available because of the concentration of experience. Too, there was no uncertainity where responsibility lay for implementing corrective action. A disadvantage of such concentration of administrative function could be that the individual engineer was sometimes not fully conversant with some of the nontechnical details of a task.

Operations and Analysis Division

The Operations and Analysis Division was organized to mate technical and tactical considerations in developing usable, effective materiel to meet requirements of troops in the field. In meeting this need, the Division was designed to serve as the Laboratory focal point for contact with outside military agencies and to interface with military operations in the field. Its mission included identifying and analyzing military requirements and making these known to the other divisions. The Division was to review Government or industry proposals in the light of current requirements before forwarding them to a technical division for analysis. Further, it was to conduct quantitative studies to establish the effectiveness, under field conditions, of either proposed or developmental items and to prepare reports describing overall needs within the LWL mission. This original mission, which was altered somewhat in subsequent reorganization, required both experienced military personnel and scientific personnel skilled in operations analysis. In the original organization, the technical personnel were divided equally between military and civilian.

Development Engineering Division

The Development Engineering Division was organized as the heart of the quick-reaction capability. Its major mission was to develop simple, reliable hardware to meet immediate needs of troops in the field. Items selected for development were to be primarily those requiring from 6 to 18 months for development of a test model and were to include communications, surveillance, and specialized electronic equipment, acoustic and seismic devices, special weapons

and munitions, special vehicles, and individual survival gear. The 6 to 18 month limit was self-imposed as a criterion for quick reaction. Although not always successful, LWL endeavored to complete tasks within 18 months throughout its existence. Even when the Laboratory went beyond this limit in developing particular item. the development time was a fraction of that experienced at other R&D laboratories.

The Division was organized to fabricate needed items in-house; to modify or redesign existing materiel or materiel based on new ideas; to utilize existing research and development capabilities, both military and industrial; and to utilize environmental resources to advantage.

Research Division

To function properly, the Laboratory required an applied research capability; this was the function of the Research Division. It was to investigate the feasibility of new techniques pertaining to the types of equipment and devices being developed in the Development Engineering Division. The Division was organized to have research capabilities in chemistry, physics, biology, botany, and zoology, with all major problems approached from an interdisciplinary view. The name of the Research Division was changed and its direction altered somewhat as the Laboratory gained operational experience; this is discussed under "Organizational Growth to Meet Requirements".

Technical Support Division

The Technical Support Division was organized to provide experimental shop facilities, a technical library, technical editorial services, and liaison for field testing in support of the other divisions. The Division was also responsible for fabrication and repair of unusual or specialized devices and was given the responsibility of controlling and supplying all property and materials.

* * * *

This was the organizational concept around which the original Laboratory was built and is one which remained surprisingly intact through 12 years

of meeting a diversity of requirements and solving countless problems in many technological areas under four different commanding officers. That so many of these requirements were met on a quick-reaction basis supports the validity of the organizational concept, and its execution.

Personnel Selection

It was decided at the outset that the technical personnel must be uniquely suited for the type of R&D program implied in the LWL charter. The individuals sought were to be self-sufficient, experienced in military research and development, and capable of generating ideas in an unfettered working environment. In addition, it was desirable that the higher grade technical personnel combine, to the greatest extent possible in each individual, competence and expertise in a given scientific discipline or technical area with a good working knowledge of at least one other area. What was sought, in effect, was the sound generalist combined with the up-to-date specialist having knowledge in depth in one or more primary technical areas. Inasmuch as LWL was expected to become fully operational within the period of a few months, it was necessary that the upper level of technical personnel be comprised of seasoned individuals having experience in a broad spectrum, including planning, management, and administration. The initial technical staff met these criteria to a substantial degree.

The selection process received an important boost in two ways. First, considerable publicity had been given to the fact that a new quick-reaction R&D laboratory was to be established within the Army. The news releases reached all Army posts and installations having technical personnel. Second, LWL was given a "hunting license" by the Office of the Chief of Research and Development to seek out and hire the best technical people available at Army laboratories and other Army installations. Though not especially appreciated by some of the laboratories from which top personnel were recruited, this privilege was most important to LWL's quick start.

By the time active recruitment for technical personnel began in June 1962 approximately 150 unsolicited applications had been received from individuals employed at various Army laboratories, principally Ballistics Research Laboratory, Frankford Arsenal, Picatinny Arsenal, Edgewood Arsenal, Signal Research and

Development Laboratories, and the Harry Diamond Laboratories. Some two dozen individuals from this group were interviewed by the Technical Director.

Concurrently with the review of these applications, the Commanding Officer, the Technical Director, and the Chief of the Operations and Analysis Division screened between 400 and 500 personnel files at Aberdeen Proving Ground and discussed their tentative findings with the APG civilian personnel chief. About 45 individuals from Ballistic Research Laboratory, Human Engineering Laboratory, and other APG organizations were interviewed as a result of this search.

In order not to overlook talent from ordnance installations other than those along the eastern seaboard, the Technical Director also examined approximately 3000 ordnance personnel record cards at Rock Island Arsenal for possible candidates. From this examination, he selected six names for further evaluation and interview.

After interviewing this initial composite group of some 75 individuals, approximately 15 were hired, mostly at the GS15 and GS14 level. These men constituted about 35 percent of the total technical civilian personnel in September 1962 and included all the Division Chiefs, more than half of the Branch Chiefs, and several key engineers. At this point the method of recruitment was changed. Where previously the Technical Director arranged the interviews and made the selections exclusively, the recruitment of candidates for the remaining Branch Chief positions was now assigned to the Division Chiefs, who with their Branch Chiefs sought candidates for the project engineer and scientist positions. Candidates passing Branch Chief and Division Chief scrutiny were given a final interview by the Technical Director.

Staffing the Laboratory with the remaining technical personnel proceeded quickly at this point since the Division and Branch Chiefs were in a position to know the talented individuals in the laboratories from which they themselves had been recruited, and drew on those very laboratories for many of the additional personnel.

As shown in Figure 2, the Limited War Laboratory was originally authorized a total of 76 personnel: 6 officers and 70 civilians of which 45 were technical and 25 were administrative, clerical, and support.

At the end of July 1962, LWL had on board the Commanding Officer, the Technical Director, the Chief of the Operations and Analysis Division, the

Executive for Administration, seven nontechnical civilians, including secretaries, and two company-grade officers. Additional personnel had been hired but had not yet reported to LWL. By October 1962, over 40 of the total of 76 authorized positions had been filled; by March 1963, all but two positions had been filled.

During the next 4 years, LWL continued to grow slowly, and by 1967 reached its peak of 20 military and 133 civilian personnel. The criteria for selecting personnel remained as originally established: individuals were hired solely on their merit and on their fitness for the task.

Organizational Growth to Meet Requirements

Major organizational changes at LWL through the years, either in structure or in top personnel (Commanding Officer and Technical Director), are reflected in the organization charts included as Figures 3 through 11. The following paragraphs discuss the reasons for these changes and the functions of the added activities.

Figure 3 shows the organization as of 15 November 1962, at the time the Laboratory was beginning to complete its staff and launch actual programs. Since these charts show names of individuals, it is interesting to compare the early charts with the final ones and discover how stable an organization LWL was from the standpoint of personnel turnover. This would seem to reflect two things. First, the care that was exercised in hiring, as discussed in the previous section, and second, the enthusiasm and support for the LWL mission that was expressed by its personnel. The changing needs within branches, which reflect changing operational needs in the field, can also be seen by following the personnel requirements on these charts.

The first organizational changes at LWL were merely redesignation of branches, as shown in Figure 4. After the first year of operation, it became clear that the Communications and Electronics Branch in the Development Engineering Division was performing the principal portion of LWL's work in electronics. On the other hand, the Electronics Research Branch in the Research Division was involved primarily in acoustics, infrared, visual optics, and noncommunications aspects of electronics. To more clearly reflect this research activity, the latter division was redesignated the Applied Research Division

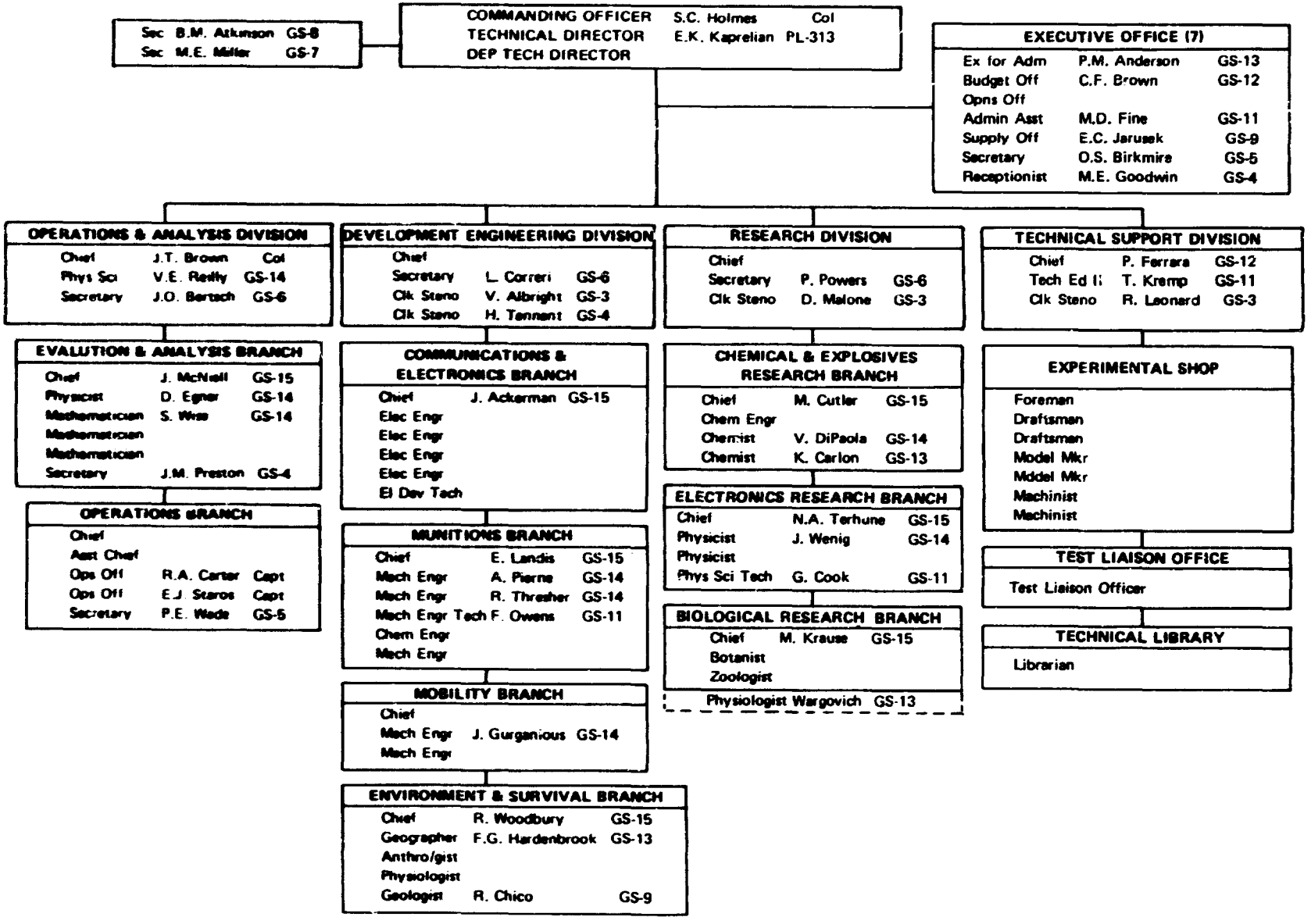
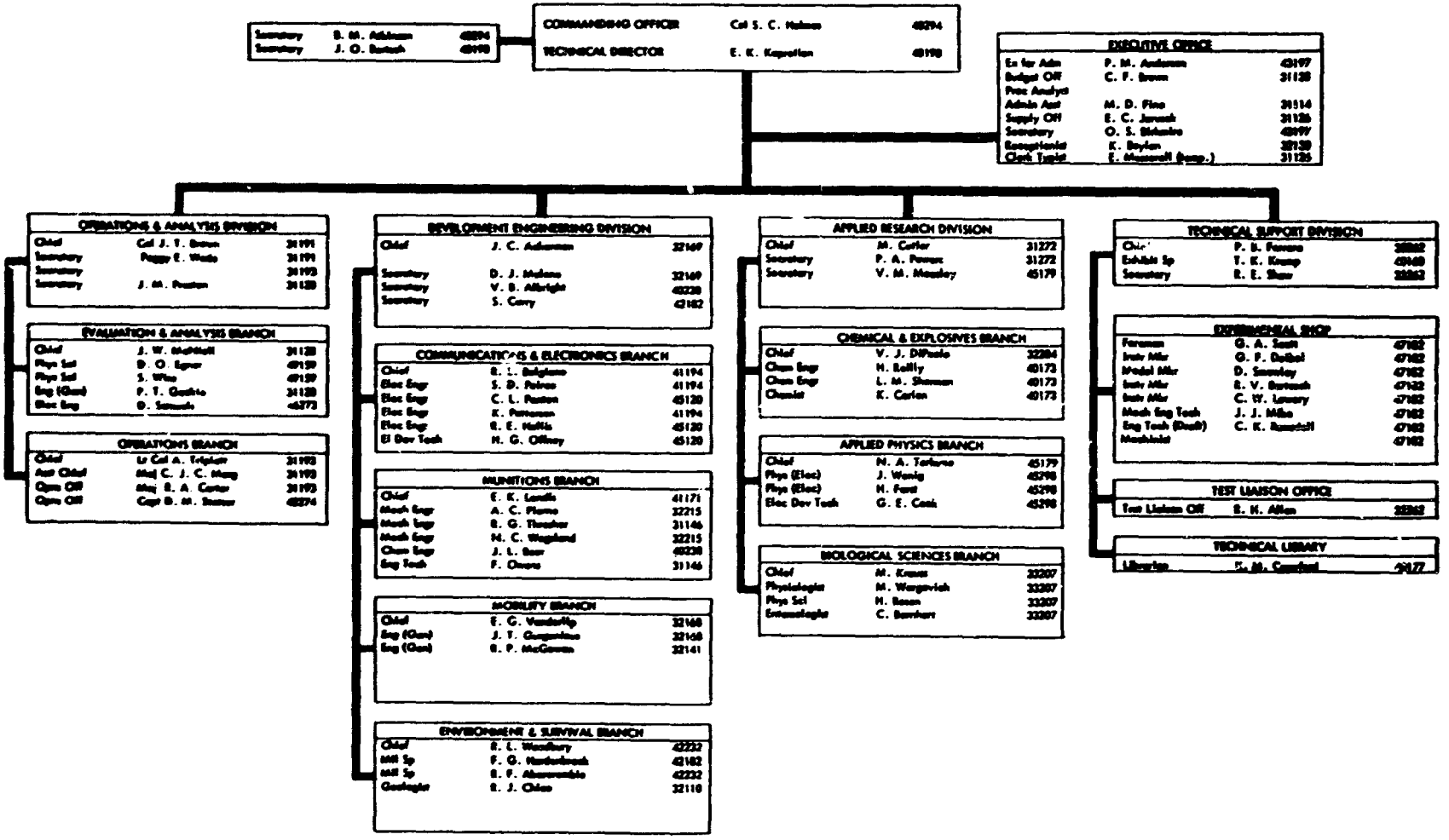


FIGURE 3. LWL ORGANIZATION CHART - 1962



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18 December 1963

FIGURE 4. NWL ORGANIZATION CHART - 1963

and the branch renamed the Applied Physics Branch. At about the same time, the Biological Research Branch was redesignated Biological Sciences Branch, again to more clearly reflect the full scope of its activity, which was touching on all the biological sciences.

In June 1965, LWL had its first change of command as Colonel R. W. McEvoy moved from the Harry Diamond Laboratories to replace Colonel Holmes (see Figure 5).

Increased U.S. involvement in Vietnam resulted in a sharp upswing in LWL's FY66 budget and in its level of activity. This sharp growth is shown in Table 1. This growth, in turn, necessitated some major changes in the organization (see Figure 6) which were effected in February 1966.

TABLE 1. ANNUAL SUMMARY OF AUTHORIZED PERSONNEL

Date	Military	Civilian	Total
30 June 1962	5	45	50
30 June 1963	6	69	75
30 June 1964	7	79	86
30 June 1965	7	79	86
30 June 1966	12	133	145
30 June 1967	20	133	153
30 June 1968	20	128	148
30 June 1969	20	126	146
30 June 1970	18	124	142
30 June 1971	18	124	142
30 June 1972	16	111	127
30 June 1973	16	110	126

Irrespective of LWL's growth, the size and importance of the military operations aspect of LWL had been increasing. Because of this, it became desirable to provide a wholly military activity, with a separate identity and autonomy. It had also become apparent that the Evaluation and Analysis Branch should operate independently of the military. With the transfer of this branch

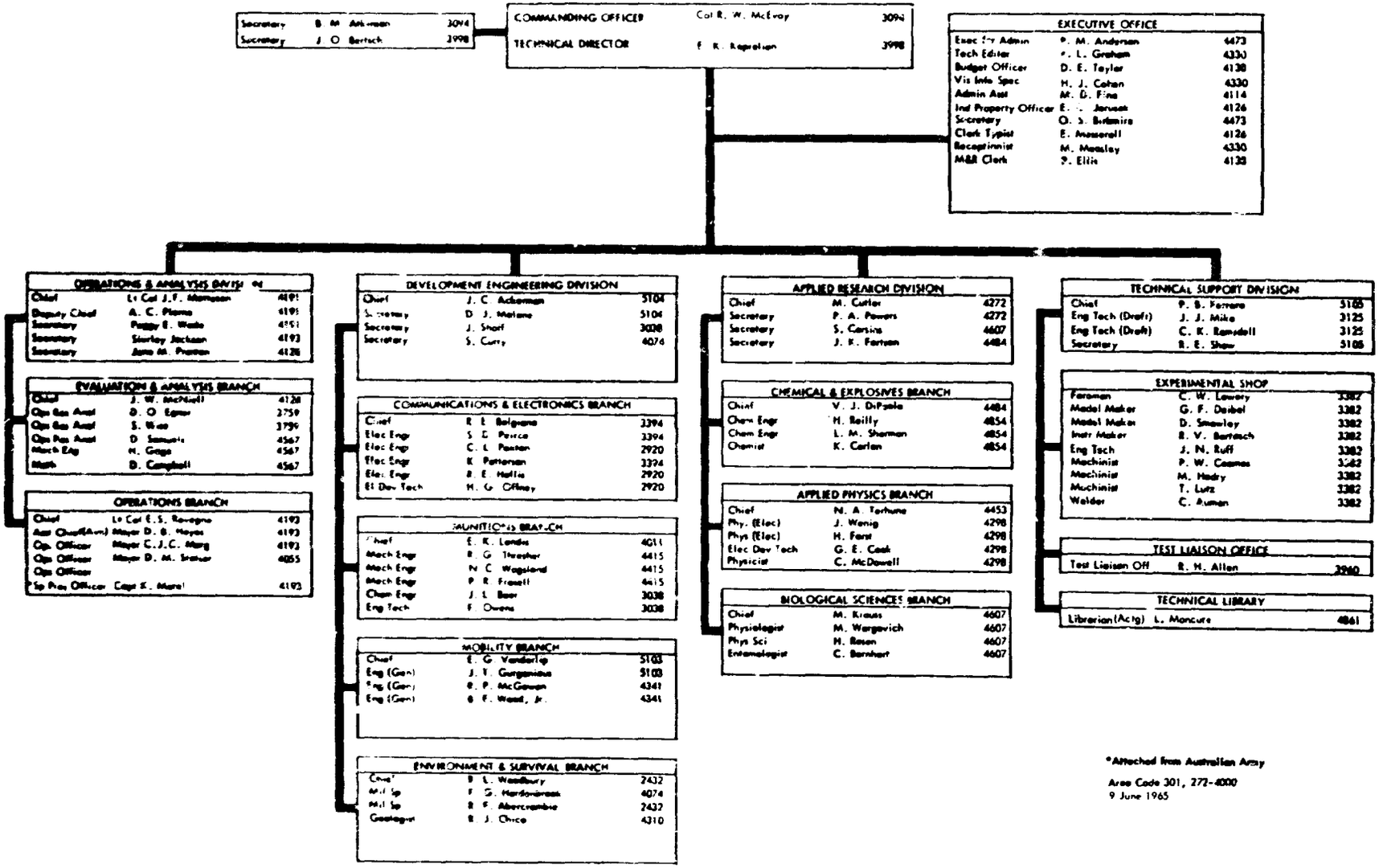


FIGURE 5. LWL ORGANIZATION CHART - 1965

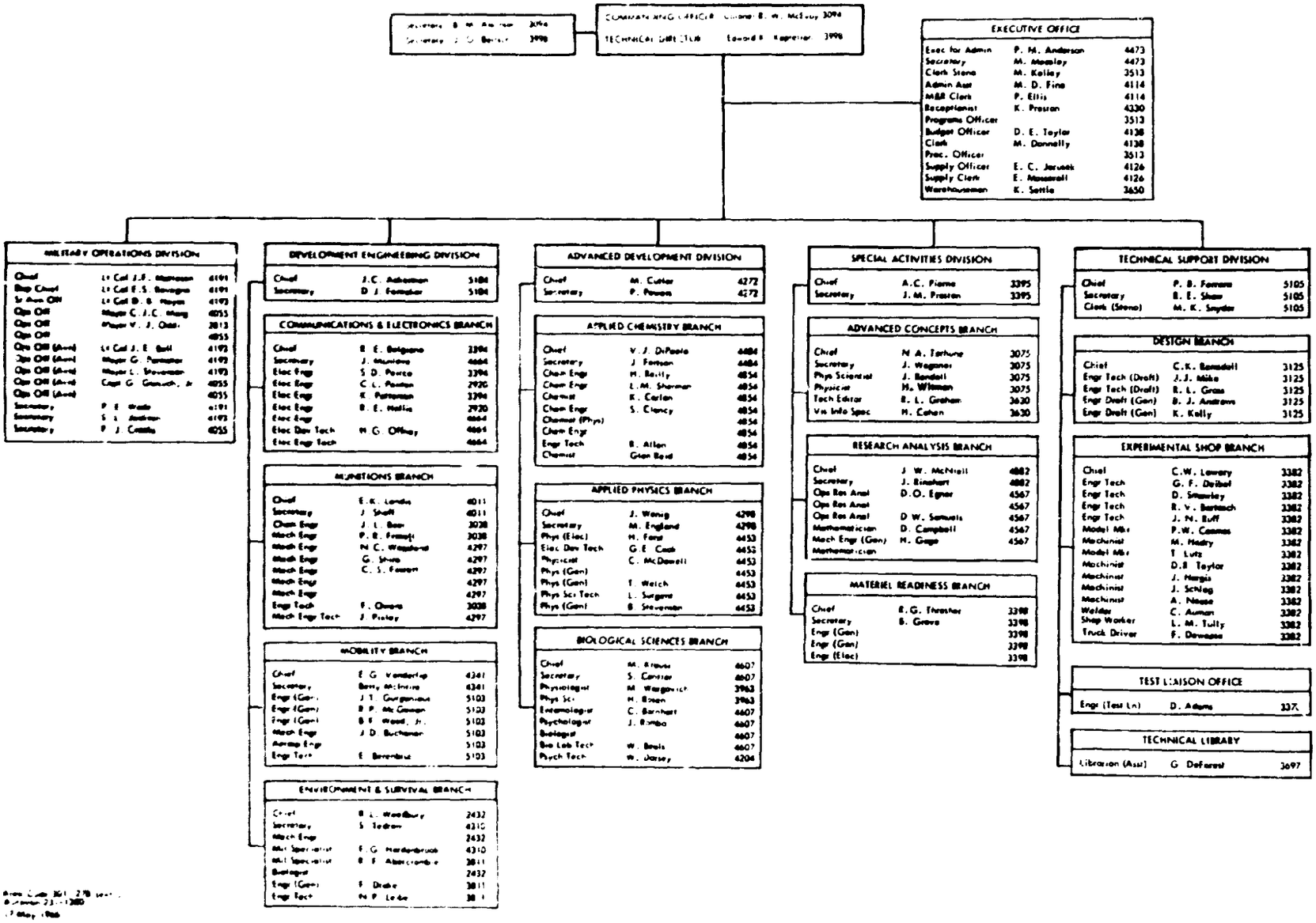


FIGURE 6. LWL ORGANIZATION CHART - 1966

to a new Special Activities Division, as discussed later, only the function of the Operations Branch remained. Thus, the Operations and Analysis Division was redesignated the Military Operations Division (MOD).

MOD was designed to provide an interface between the military user and the Laboratory. It was expected to keep abreast of doctrine, tactics, and materiel being employed by forces in the field and to provide a focal point for coordinating the needs of these forces, requirements, and equipment developments in the Laboratory. The Division also monitored LWL tasks to provide operational input and advice on evaluations, and provided military support, including aviation, for conduct of tests, demonstrations, and briefings. Finally, MOD served as advisor to the Commanding Officer in his approval of tasks. To provide this advice, an Operations Officer was assigned to monitor each LWL branch.

In filling MOD slots, a major criterion was recent combat experience in order to provide closer orientation with actual problems in the field. R&D experience was not considered a prerequisite, and few MOD officers came with such experience. The only possible drawback to this was a 4- to 6-month learning phase in the 3-year tour of duty, but this may have been necessary in any case, considering the unique aspects of LWL's approach to R&D.

The MOD function was obviously vital to LWL's mission. This direct military interface, unique to Army R&D laboratories, was an essential ingredient of the quick-reaction capability. The daily interaction between the user and the developer as opposed to periodic consultations at an IPR insured that no impractical aspect of a developmental item could proceed very far. Thus, very little time or money was wasted at LWL and the hardware, if technologically successful, was generally operationally suitable. However, as might be expected, the operation was not without some conflict within the Laboratory. MOD tended to view part of its function as one of keeping research in bounds; tempering the enthusiasm of engineers who might get carried away with a project because of its interest, not necessarily its operational worth. MOD's view could, of course, be clouded by its orientation to the "Army way". This could be manifested in its advice regarding task approvals. Exercise of this role tended to be looked upon by the engineers involved as undue and short-sighted military interference that stifled creative development. Probably the end result was beneficial to LWL as a whole, as well as to both parties to the "conflict". The military, with its conservative "Army way" approach, possibly did pull the reins on some research that threatened to get out of acceptable bounds, without actually stifling LWL's mission. At the same time, some of the

creativeness and enthusiasm engendered in the LWL operation may have served to broaden the military perspective and allowed not only acceptance but wholehearted support of ideas that may have appeared militarily unacceptable on the surface. Such military support could be critical in introducing the item operationally.

There was one drawback to MOD as it evolved but this was attributable to other conditions and not the concept. As discussed later, when LWL became heavily involved in the development of airborne items, it required eight aircraft and needed people to fly them. The military was the only source of pilots. Thus, the size of the MOD Division grew to fill this need (reaching a high of 20 personnel and nearly 13 percent of LWL's authorized strength in 1969). This had two unhappy consequences; first, a military-civilian ratio that was too high for the Laboratory's purpose, and, second, a preponderance of military personnel with a strong orientation toward aerial, rather than ground, combat.

A second major organizational change in February 1966 was a redefinition of the functions of the Applied Research Division, including a change in name to Advanced Development Division. The redefinition was in reality merely a recognition of how the Division was operating. The original concept of an Applied Research Division was based on the idea that the Division would provide technology, which would then be converted into operational hardware by the Development Engineering Division. In practice, this transfer never took place since the new ideas and concepts initiated in the Division were carried through to fruition by the engineer who originated the idea. He was motivated and capable of bringing his own innovations all the way to the prototype stage. At the same time, an engineer in the Development Engineering Division, who might have logically picked up the task, was already busily engaged in carrying out his own innovative effort; he had no particular inclination to divert attention to another man's innovation. Therefore, the projects in the Applied Research Division, just as in the Development Engineering Division, were developmental and it had to be recognized that LWL, by the nature of its quick-reaction mission, did not and could not logically engage in research. The name change resolved the problem of trying to explain the term "research" in the light of the LWL mission. By the same token, the Chemical and Explosives Branch was redesignated Applied Chemistry Branch, more nearly reflecting its scope of work.

This redefinition of the Advanced Development Division left certain advanced concepts to be accounted for. These studies, and some personnel from the Applied Physics Branch, were incorporated into an Advanced Concepts Branch. At the same time, a requirement for a materiel readiness accountability, separate from the R&D groups, arose. By this time, many programs were reaching a stage of production the responsibility for which did not exist at LWL and which had to be phased into parent agencies in AMC. The procedures involved were more than the branches could handle and the Materiel Readiness Branch was created to perform this function. These two new branches were incorporated with the Research Analysis Branch (formerly the Evaluation and Analysis Branch, Operations and Analysis Division) to form the Special Activities Division (see Figure 6). Detailed functions of this Division and its branches are spelled out in LWL Directive No. 2, Mission and Functions (Exhibit 6, Appendix A).

The growth of the Laboratory during this period caused a parallel growth in activity of the Executive Office and stratification of its work into three distinct functional areas. As a result, this Office was redesignated the Program/Operations Division with an Administrative Services Branch, Logistics Services Branch, and Program/Budget Branch. This change is reflected on the 18 April 1968 organizational chart, Figure 7. This chart also reflects the deactivation of the Advanced Concepts Branch. Most of the few remaining functions of the Branch were absorbed by the Applied Physics Branch; some of its miscellaneous functions were added to the Technical Support Division.

The overall function of the Program/Operations Division remained much the same as that of the Executive Office. Functions of the three branches are self-explanatory but are detailed in LWL Directive 2 (Exhibit 6, Appendix A).

With the departure of Mr. Kaprelian at the end of 1967, LWL was left without a Technical Director for the better part of a year. This was remedied in the Fall of 1968 when Dr. R. D. Shelton accepted the post. The following June, Colonel R. A. Axelson became LWL's third Commanding Officer. These changes are shown in Figure 8.

In January 1970, LWL was redesignated the Land Warfare Laboratory, per Department of the Army General Order No. 5, 21 January 1970 (Exhibit 7,

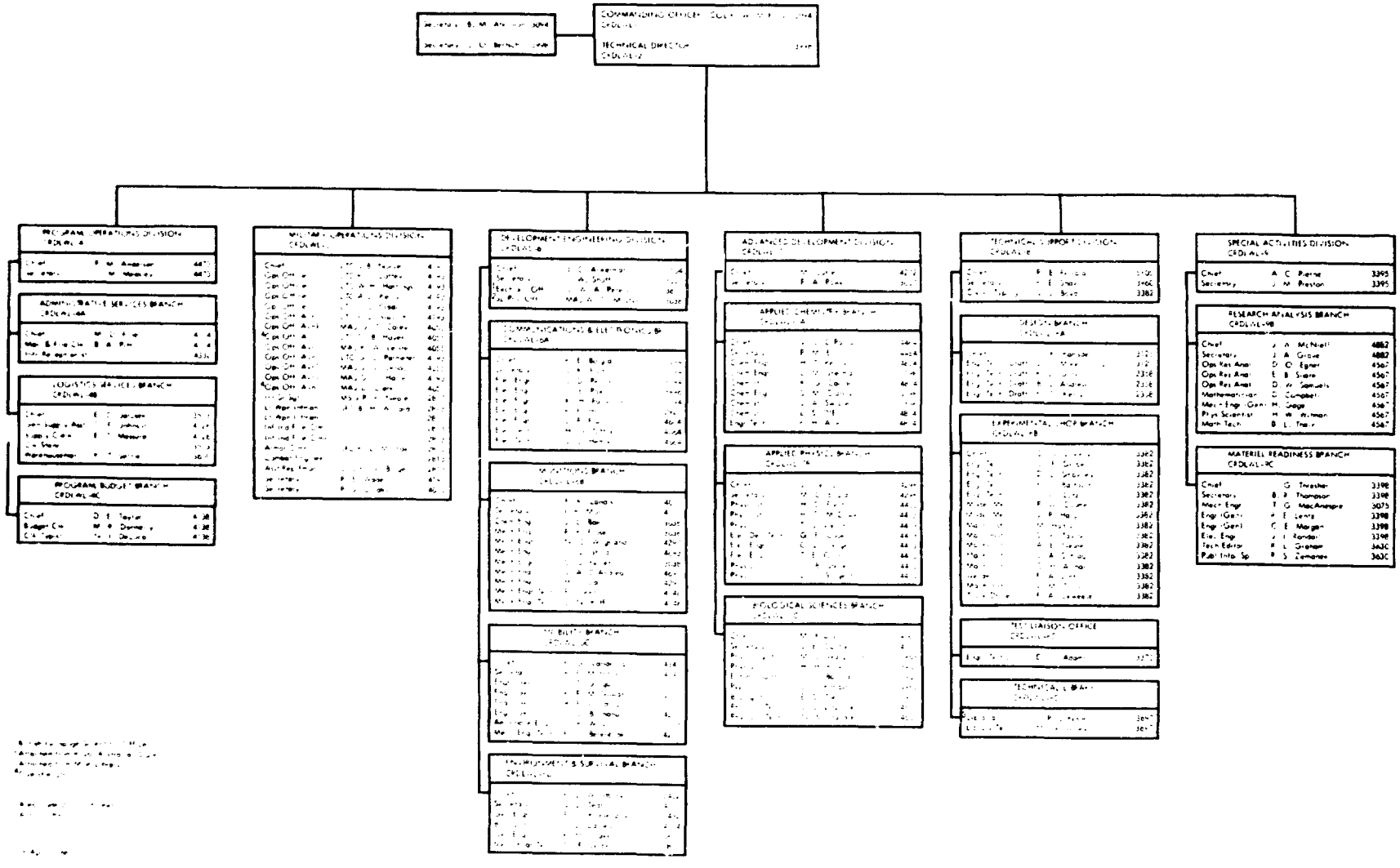


FIGURE 7. LWL ORGANIZATION CHART - 1968

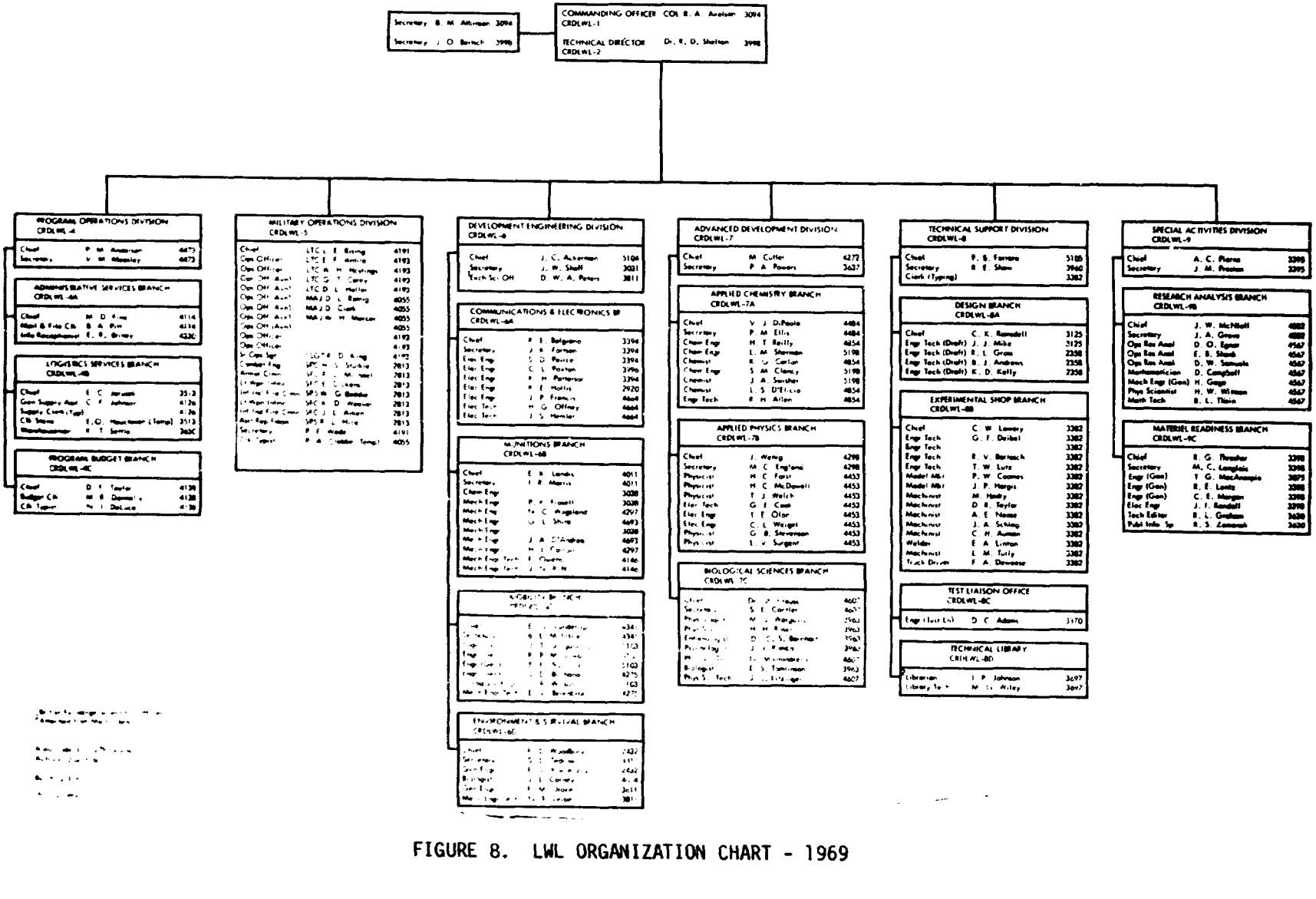


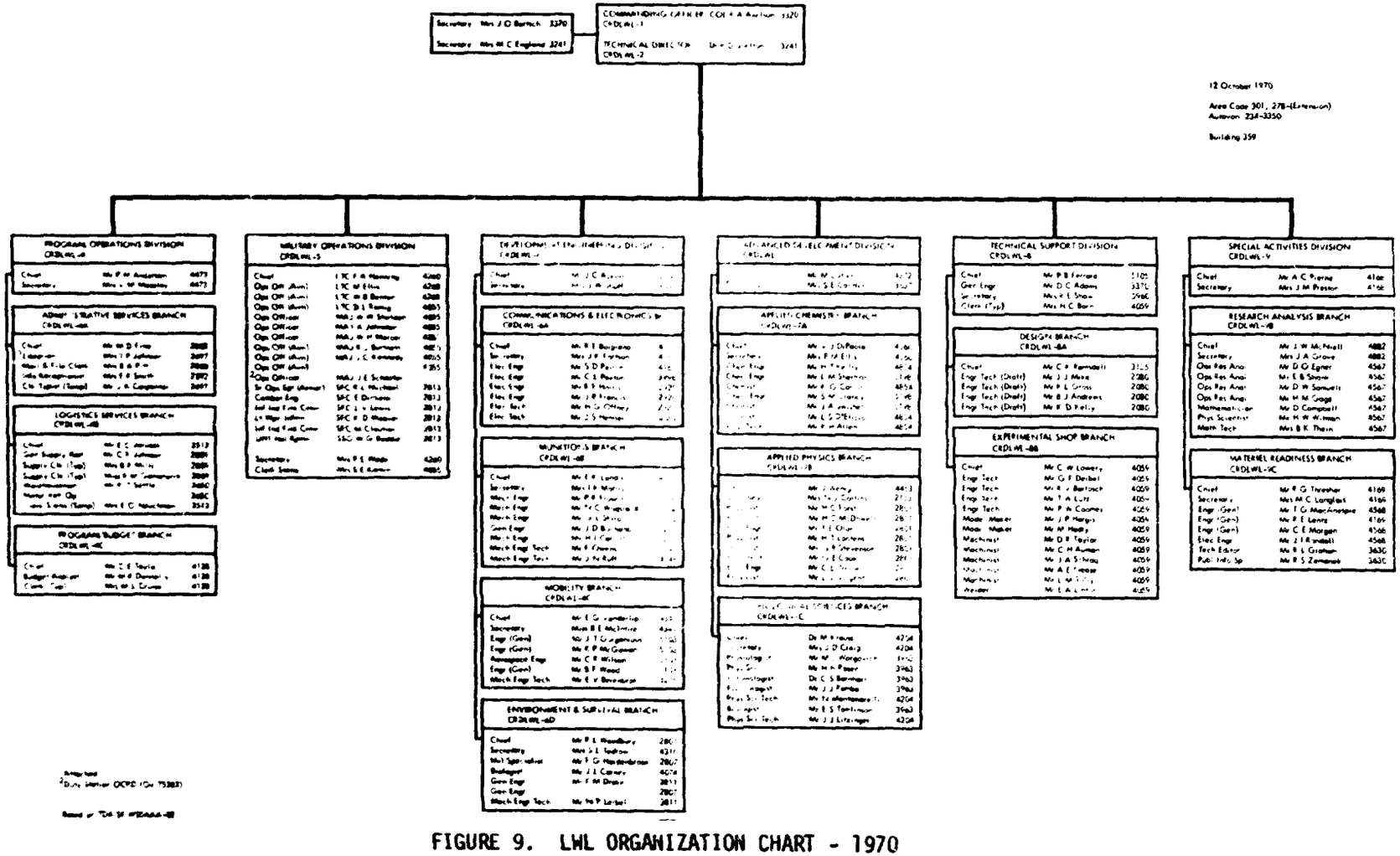
FIGURE 8. LWL ORGANIZATION CHART - 1969

Appendix A). The Laboratory's mission was changed to that noted earlier in the "Mission" section of this report. Although this eliminated words such as "limited war", "low intensity", and "remote areas", the purpose of the Laboratory, to develop operational items and techniques on a quick-reaction basis, remained unchanged. No organizational changes accompanied this re-designation.

However, there was some redirection in the scope of activities during a period beginning in 1968. Until that time, LWL's program had been directed almost exclusively toward problems evolving from the SEA conflict. As civil disturbances and riot control became increasingly important in the country's internal affairs, LWL was able to reorient a portion of its effort toward R&D requirements in these areas, again on a quick-reaction basis. Later, as the SEA conflict began to wind down, problems of the Army in other areas of the world became increasingly important. Once again, LWL was able to redirect a portion of its effort to these problems. These changes in direction will be evident in perusal of LWL tasks in Appendix B.

Also in 1970, the Technical Library was dropped from the Technical Support Division and the Test Liaison function was established in the Office of the Chief of the Division, as shown in Figure 9. The activity in the Design Branch and the Experimental Shop Branch had increased markedly through the years and it was decided that the unrelated library activities diverted effort from primary functions.

In the Spring of 1971, Colonel R. L. Clarkson joined LWL as its fourth and final Commanding Officer. Later that year, the Laboratory underwent a general reorganization in order to strengthen itself in light of then current demands. These changes are shown in Figure 10. The reorganization stemmed from the pressures of the Army's withdrawal from combat in Vietnam and the concomitant reduction in force, in average grade, and in funding. Additionally, there was an ever-increasing requirement to justify the existence of a quick-reaction capability during peace time and a laboratory which had come to be associated closely with the conflict in Southeast Asia. The counter to these pressures appeared to lie in a strengthening of the worldwide role which was made possible under the mission change of 21 January 1970. It also became necessary to prove to critics that it was, in fact, possible for LWL prototypes to be accepted into the materiel-acquisition cycle and carried through by the commodity commands of AMC into



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Building 359

FIGURE 9. LWL ORGANIZATION CHART - 1970

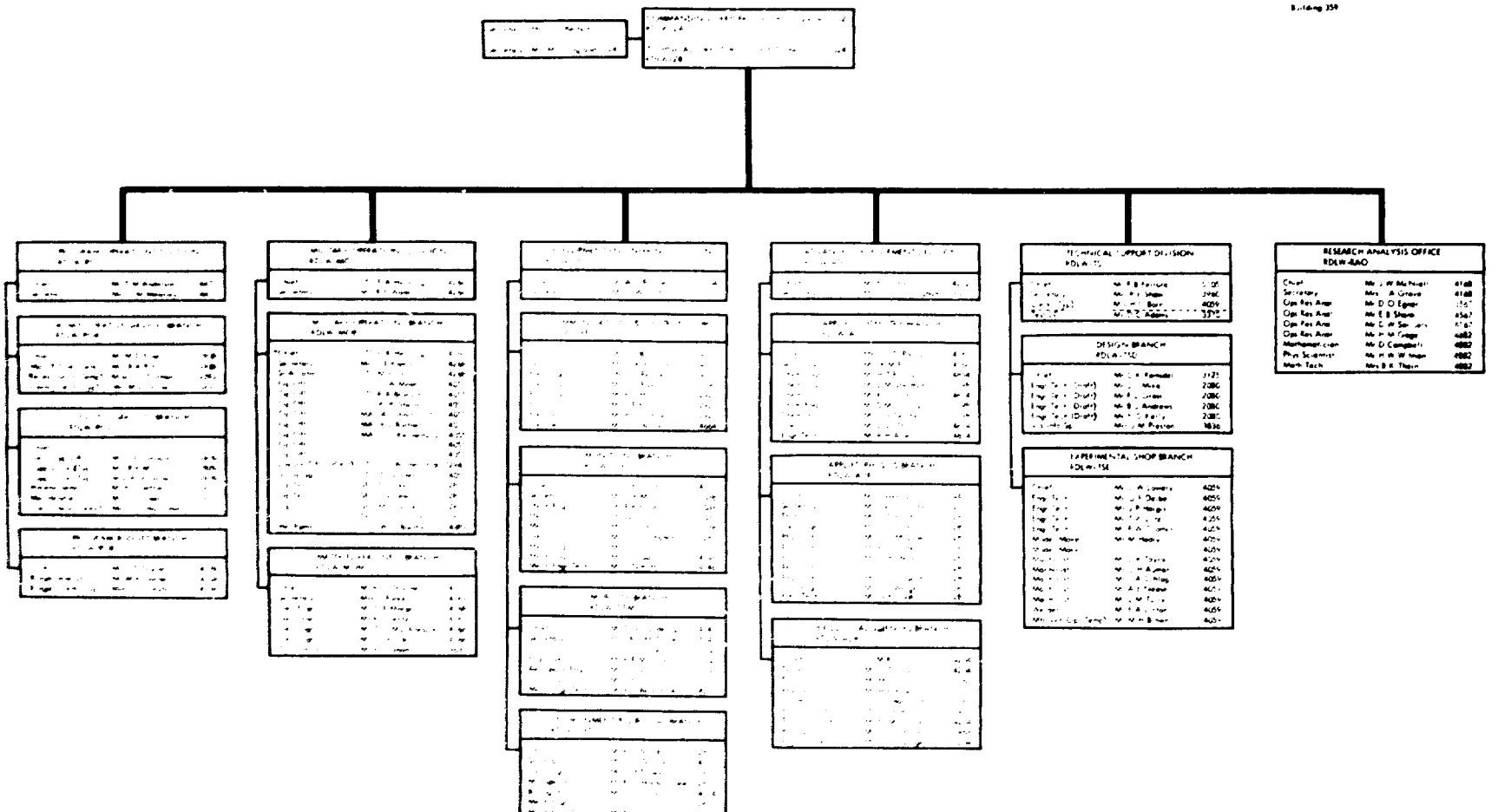


FIGURE 10. LWL ORGANIZATION CHART - 1971

production items for regular issue to the U. S. Army. It had become apparent that the provision of limited production quantities of nonstandard items, which had heretofore been accepted as evidence of LWL's success, would no longer be adequate justification for the Laboratory. The dissolution of the Special Activities Division saved some spaces and contributed to the reduction in average grade in the Laboratory. The movement of the Materiel Readiness Branch under the Military Operations Division recognized the relationship between the liaison with outside agencies being conducted by both of these elements of the Laboratory. To improve the inherently difficult procedure of introducing LWL items into commodity commands, the Military Operations Division was directed to prepare draft requirement documents for all LWL tasks and to inject them into the formal requirements definition system at the earliest appropriate time. This was a requirement of LWL's original charter which had fallen into disuse as the resulting documents were too much for CDC. By 1971 the value of having a draft requirements document to serve both as the in-house guidance to the developer and later to smooth the way into the Materiel Acquisition System became apparent. The Materiel Readiness Branch assisted in this process by becoming the strategist and the marketing experts devising the most effective means of introducing each particular item into the system. The Branch was performing much of the liaison with the developers, while the military members of the Division concentrated on the users. The Research Analysis Office had, by this time, assumed a dual role of service to the Laboratory in general and a source of special studies for the Commanding Officer and the Technical Director. The designation of this element as a separate office recognized these two roles. In November 1971 the new role of LWL was officially recognized in a letter from the Chief of Research and Development which elaborated and clarified his understanding of LWL's mission and functions (this letter is included as Exhibit 8, Appendix A).

In December 1972, the Chief of Staff of the Army directed that insofar as possible, Class II activities of the Department of the Army should be transferred or eliminated. In response to his desire that the DA staff return to a policy-making role and terminate its operational activities,

effective 15 February 1973, LWL was transferred from its status as a Class II activity under OCRD to the jurisdiction of the Commander, U.S. Army Materiel Command. (The General Order effecting this change is included as Exhibit 9, Appendix A.) Under this transfer, however, LWL retained its organizational structure and mission.

As activity in Vietnam ground to a halt, what had become an annual reduction in the personnel strength and funding for the Laboratory continued. Initially, the administrative support elements were reduced to a bare minimum, but as the productive elements inevitably became affected, the ratio of support to professional endeavor, as well as the ratio of developmental funds to overhead costs, became a matter of concern to the Laboratory management. Although there was no decrease in the problems being discovered in the field and the number of tasks initiated in response did not decrease, the nature of the tasks began to change toward smaller, simpler items which necessarily attracted less attention and provided less justification for LWL. Despite these changes the only organizational change required in this time frame was the return of the Program Operations Division to its original title of Executive Office. This change reflected the reduction in support personnel to the point that a division with branch chiefs could no longer be justified. The functions of the office remained unchanged. This change is shown in Figure 11. It should be noted that the only apparent difference between this organization and that shown in Figure 3, other than a few changes in titles, is the addition of a Research Analysis Office.

LWL Organization Versus Program Manager Concept

Although the organization chart for LWL was conventional in structure, its internal functions differed from those of the usual "program manager" arrangement. There were no program managers as such in LWL. Each engineer was project engineer for those developments assigned to him; whatever program management was provided by the Branch Chief or Division Chief was more in the nature of scrutiny, comment, and guidance than management. There was, accordingly, a large measure of autonomy at all levels, commensurate on one hand with the experience and skill of the engineer and on the other with the importance and complexity of the project.

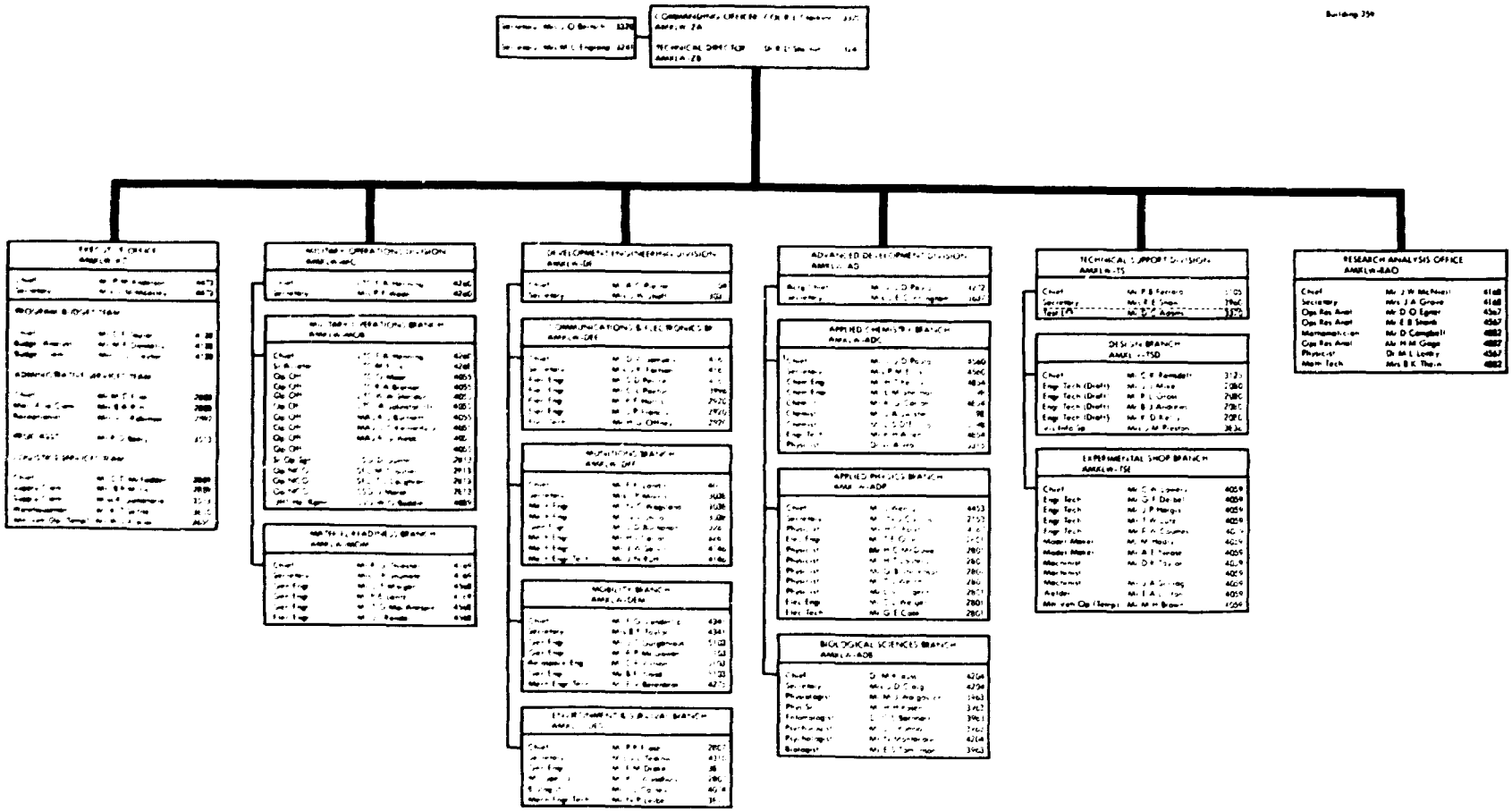


FIGURE 11. LWL ORGANIZATION CHART - 1973

The heavy reliance on each project engineer in the various branches to exercise the necessary technical and managerial judgment required that the project engineer be granted authority and responsibility in equal measure. The chain of command was short: project engineer to Branch Chief to Division Chief. In some cases it was shorter, inasmuch as the Branch and Division Chiefs themselves were working engineers and many carried their own R&D projects in addition to supervisory duties.

This organizational philosophy, together with the characteristics of the technical personnel selected for LWL - innovative, competent, self assured - resulted in an unusual atmosphere of constructive competition. Exchange of information was made freely and mutual cooperation was the norm.

The mechanism for the initiation and control of a project was simple and straightforward and is discussed in greater detail in a later section. Relative to this discussion, it is sufficient to say that well prior to the start of the fiscal year all candidate projects, whether internally generated or based on requirements from a user, were written up on project forms, which included the milestone dates, cost, and other important factors for consideration by a "murder board" comprising the Commanding Officer, Technical Director, and the Chiefs of the Military Operations, Development Engineering, and Advanced Development Divisions. Those projects approved by this board immediately became part of the program. It is important to note that the estimates for cost, milestone and delivery dates, performance, and all other factors were made by the project engineer himself. The project engineer thus committed himself to perform according to a schedule that he himself had established.

The status of each project was reviewed in depth at regular intervals with intermediate reviews as problems or circumstance dictated. During the weekly staff reviews all aspects of the projects of one branch would be covered - progress, cost, milestones - to the depth demanded by the circumstances and priority status. At these reviews, the scope and orientation of a project could be changed, its milestones revised, and its level of effort increased or decreased. Thus, during the period of 7 weeks, the entire program of more than 100 projects was reviewed.

The review meetings were particularly important in helping to meet a major problem of the Laboratory - when to cut a program off. It has been noted

that LWL was intended to provide the best solutions available in a limited time, not optimum or ultimate solutions. Yet there was a strong, and understandable, tendency to keep working toward that ultimate solution, particul rly if it seemed to be just around the bend. The idea of a "best possible" solut on in a "minimum" time is really quite subjective. Determining when this had been achieved was not always easy. Even when such a determination was made, it was not always easy to stop if further progress appeared close at hand. The frequent reviews, and frank discussions involved in them, helped in making these subjective decisions.

In addition to the program of weekly branch reviews, certain special reviews were conducted on various occasions. In 1971 as a result of the Laboratory's very extensive involvement in sensors and detection devices, the Commanding Officer requested of the Research Analysis Office a brief review and display of all LWL's work in this area. The results were most useful in highlighting gaps as well as overlaps and duplication so that appropriate decisions on the continuation, termination, and consolidation of certain tasks could be made. Within a brief time after this, the Laboratory had clear objectives and the relationships of various tasks could be readily understood. In October and November of 1972, three special reviews were held to examine the Laboratory's work in atmospheric sensors, in civil disturbance, and in drug detection - three areas in which related work was being pursued across branch and division lines. These reviews, which were held at the suggestion of a team from the Army Audit Agency, were helpful and this type of review would undoubtedly have continued in various areas had not the Laboratory begun to phase down. Nevertheless, as was pointed out to the Army Audit Agency, in a Laboratory no larger than LWL, the Commanding Officer and Technical Director are capable of maintaining intimate day-to-day knowledge of all of the significant work going on. Time consuming, formal briefings should be held to a minimum.

FACILITIES

In the first meeting of the LWL Planning Group on 23 April 1962, Major General G. W. Power outlined the concept for LWL facilities as "a rather modest laboratory. It should have a model shop and machine shop--with a fabrication capability to build breadboard models". LWL stuck very closely to this concept in its development; most R&D work was done contractually and the laboratory facilities were used primarily for checking and monitoring this developmental work. Although limited, the equipment proved sufficient and, perhaps more important, operators were sufficiently skilled and versatile so that an engineer could walk from his office to the shop with some sketches and have them quickly transformed into models.

Even though the plans called for "modest" facilities, the beginnings were perhaps more humble than anticipated, certainly less than ideal. While permanent facilities were being renovated to meet LWL requirements, temporary quarters were established in an old two-floor frame structure, badly in need of paint, and adaptable only to LWL's office space requirements. Since the permanent facilities would not be ready for about 18 months, it was also necessary to make some provision for laboratory and shop space. This was done by obtaining vans and trailers from the salvage yard, repainting them, setting them up across the street from the office, installing the necessary equipment, rolling up the sleeves, and going to work. That no one complained only illustrated the enthusiasm with which LWL personnel approached the concept of a quick-reaction laboratory. Actually, when it came time to move to the new quarters, many had become so adjusted to these temporary laboratories that they were reluctant to leave. Despite the inconveniences, the Laboratory's program was already well underway and LWL was established as an important part of the Army's R&D program.

Permanent Laboratory and Administrative Facilities

LWL was permanently housed in two, two-story brick buildings. One of these housed administrative and research offices and laboratory space. The second building was adjacent and housed the experimental and carpentry

shops as well as additional laboratory space. Floor plans of both buildings are shown in Figures 12 and 13. The location of the various offices and laboratories in this floor plan was not a haphazard thing. In the first place, branch offices were located as close to the corresponding laboratory as possible. Secondly, to encourage communication and interaction, branches with related interests were located close to each other. Thus, the Applied Physics Laboratory was adjacent to the Communications and Electronics Laboratory. Likewise, the Applied Chemistry, Biological Sciences, and Environmental and Survival Laboratories were near to each other.

Parts of other buildings were also utilized as needed, including a warehouse facility immediately behind the office building. In total, LWL had 37,000 square feet of laboratory space, 2,600 square feet of administrative space, and an additional 12,500 square feet primarily for storage.

Each of the branches had its own laboratory. These were quite compact but well equipped and, with the personal ingenuity extant at LWL, were surprisingly versatile in their capacity. The layout of these facilities, as noted, was conducive to quick reaction and to multidisciplinary research with no one or no thing more than a few steps away.

Test and Evaluation

LWL's quick-reaction capability demanded that suitable areas and facilities for test and evaluation of developed items be readily available. Many items, of course, were evaluated in Vietnam under actual combat conditions, but it was also necessary to have facilities available for testing that would simulate operational conditions. With their own facilities, and with those available through the Army Test and Evaluation Command (TECOM) located at Aberdeen Proving Ground, LWL was able to conduct most tests and evaluations with no delay and without the problem of getting on someone else's schedules. LWL Directive No. 31, included as Exhibit 10, Appendix A, outlines the preparation of evaluation plans.

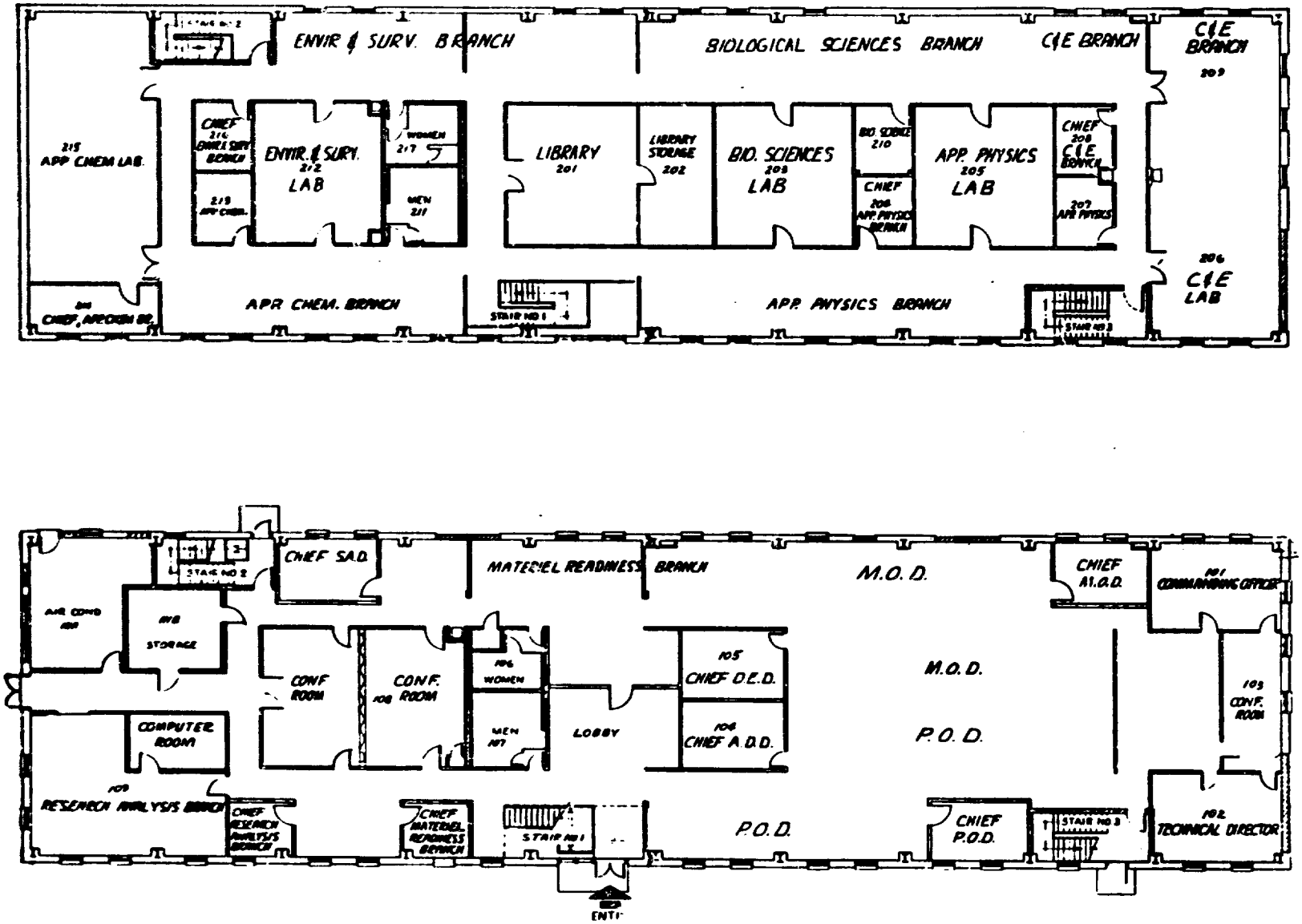
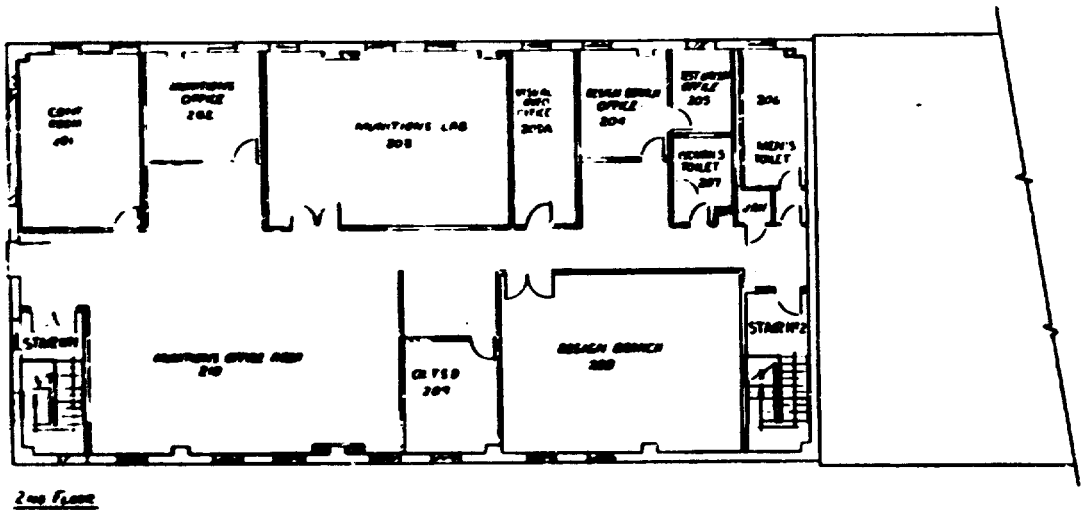


FIGURE 12. FLOOR PLAN - ADMINISTRATIVE AND RESEARCH OFFICES



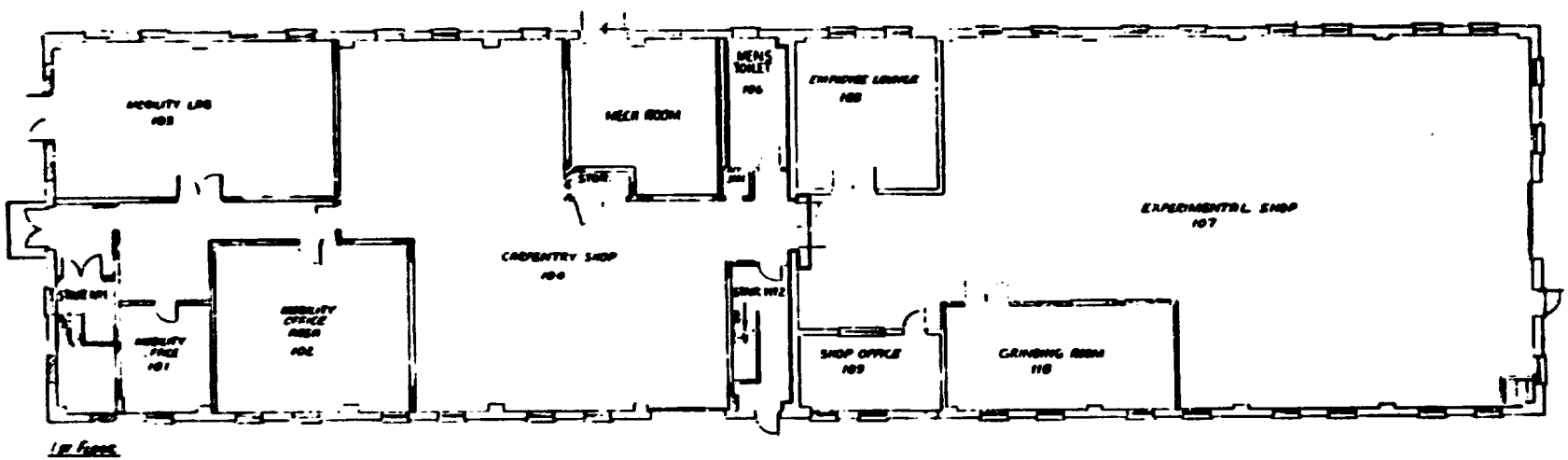


FIGURE 13. FLOOR PLAN - EXPERIMENTAL AND CARPENTRY SHOPS

Part of Spesutie Island in Chesapeake Bay adjacent to and a part of Aberdeen Proving Ground was operated by LWL as an area for field testing. The island offered all types of terrain--wooded areas, swamps, level ground, embankments, and a beach area. Firing ranges, bombing ranges, firing pits, and block houses were added as needed. LWL also operated its own fleet of eight aircraft, including a passenger plane and a cargo transport, for testing of the many airborne items developed. An operational airbase was available at Aberdeen Proving Ground. To facilitate use of the aircraft, eight personnel spaces for pilots were eventually included in the Military Operations Division. LWL also owned its own boat for test purposes. The Aberdeen Proving Ground facilities included necessary firing ranges, explosives testing areas, and drop areas, which were readily available to LWL.

Arrangements were made with TECOM for ready access to its facilities (with reciprocal arrangements for TECOM use of LWL Spesutie Island test areas). LWL Directive No. 10, included as Exhibit 10, Appendix A, outlines these arrangements. In addition to test areas at Aberdeen, TECOM has test centers in Panama and Alaska; and at Yuma, Arizona; Ft. Huachuca, Arizona; and White Sands, New Mexico. The ready availability of these facilities provided LWL with as wide a variety of facilities and conditions as it needed in most cases. There were also specific liaison agreements for test and evaluation with other organizations such as CDC and MASSTER. (See copies of agreements in Exhibit 12, Appendix A.)

Equipment and Instrumentation

The equipment available at LWL has already been alluded to in the above discussion. Exhibit 13, Appendix A, provides a listing of each piece of fabrication and testing equipment available in the LWL shops and laboratories. This equipment was sufficient for modeling in the developmental process, and probably more important than the exact inventory of machinery, was the expertise, versatility, ingenuity, enthusiasm, and dedication of those using it. LWL was very careful in hiring highly skilled and versatile machinists at the start and most of these people remained for the life of the laboratory. From the start, close relationships developed between engineers and shop personnel, further enhancing LWL's ability to react quickly. This close relationship between office

and shop could be attributed to the compactness of the laboratories and the small, uncomplicated, organizational structure, as well as the enthusiasm of all those involved for the work LWL was doing. As noted before, the laboratories were equipped to allow LWL to monitor contractual efforts and to conduct what in-house development and testing work was necessary.

The offices were also adequately equipped with the standard typewriters, MT/ST machines, copying machines, and calculators.

Contract Services

The facilities described above were what LWL could afford to maintain considering its limited budget and manpower. Obviously, they were inadequate to conduct the full range of tasks that LWL undertook, and there was no intention that they would be. With a maximum professional manpower of about 70, there was no way LWL could adequately conduct in-house the 100 to 150 tasks that might be active at any given time. Many tasks were, therefore, conducted on a contractual basis. However, many were also conducted in-house, and for these it was necessary to have some extension of the LWL in-house capability that could be made available virtually on a moment's notice. There was seldom time to go through a lengthy procurement negotiation process when the need for some service that LWL could not provide in-house suddenly arose.

To meet this need, LWL conceived the utilization of supporting R&D contracts. These were requirement-type contracts for particular capabilities, not for specific items. The contracts were competitive, were for only one year, and were limited to companies within an 80-mile radius of LWL. This allowed for easy 1-day travel and quick access to talents and services. Once the contract was signed, work orders for specific items or services could be placed against it, as needed, negotiating the price up to $25,000. These arrangements were intended primarily as an extension of the LWL in-house capability and were used mostly to solve problems originally retained for in-house solution. A service contractor provided technical know-how, as well as shop and testing facilities to each of the branches. When an engineer found LWL capabilities inadequate to meet a particular need, he could find help as close as his telephone by calling his appropriate service contractor. These contracts were closely controlled at LWL and, with 10 to 15 in effect at any one time, no problems of abuse were encountered during the 10 years the concept was used.

MANAGEMENT PHILOSOPHY

The management philosophy at LWL was a direct reflection of the quick-reaction mission -- find the shortcuts and use them. This will be evident time and again in this report. From program planning and budgeting, through procurement and program execution, everything possible was done to expedite things and to circumvent the red tape and bureaucracy that could kill the quick-reaction capability. When LWL needed something, it normally needed it yesterday, because some soldier in the field needed it the day before that. This is not to say that the Laboratory attempted to ignore or trample established, and often necessary, procedures. But it did seek any available means to expedite these procedures. The service contract arrangement has already been discussed. This was one means by which LWL could obtain services much more quickly than through standard procedures. Other means will appear throughout the following section. The Laboratory, of course, had one leg up to start with, with its direct reporting to OCRD and shortened chain of command. Another important factor, mentioned before, was concentration of all contract and procurement activities in the Executive Office.

Post Support

A laboratory the size of LWL was not able to provide all the services and support necessary for self-sufficiency, and it was necessary to rely on APG administrative facilities for assistance in many areas. This worked reasonably well--it had to since there were really no alternatives--but the arrangement was not without problems.

One reason Aberdeen was selected originally was because of the existing R&D environment there and the availability of related services. It was thought that this experience would facilitate handling of the many administrative problems that would be encountered, particularly in the areas of procurement and contracting. This was certainly true to some degree. On the other hand, the LWL operation was unique and presented a unique set of problems. Many times LWL had to find its own solutions and then overcome the inertia of a post that had become very set in its ways over some 45 years of operation in order to implement these solutions. Once LWL had fought a few problems as close to the top as necessary and established

its priority and the fact that its operation did present some unique circumstances that required a different set of procedures, things smoothed out.

The basic areas in which LWL was dependent on post support were:

- Procurement/contracting
- Engineering and maintenance services
- Personnel
- Safety
- Security
- Accounting services (Comptroller's Office)
- Printing
- Postal services.

The LWL experience with APG support for procurement and contracting serves as an example of the LWL/APG relationship through the years. With LWL's initial actions to obtain contracting services, it became apparent that R&D procurement facilities at APG were hopelessly inadequate. Most procurement activity entailed acquisition of post, camp, and station types of requirements. R&D contractual needs were allocated by the APG procurement activity to the then-existing Ordnance Procurement Activity/Centers. These were generally located in major industrial/commercial centers, and early LWL efforts to utilize these ordnance procurement centers were less than satisfactory. It was not feasible to imbue these centers with the LWL quick-reaction/sense of urgency attitude. The geographic separation of the procuring function and the technical requirement rendered effective communications extremely unlikely.

Accordingly, as one of the first orders of business in the support area, LWL requested the assistance of the Chief of R&D, AMC, in allocating spaces to the APG procurement function for the support of LWL in its quick-response R&D mission. In addition to allocation of three spaces for the exclusive support of LWL, AMC initiated action to strengthen the R&D procurement element of the Aberdeen Proving Ground.

Notwithstanding this emphasis, lead time between placement of the requirement and award of contract was unacceptably long. Again, LWL solicited assistance from the Chief of R&D in reducing procurement lead time.

Brigadier General Henry A. Miley, then Chief of the Procurement and Production Element of AMC Headquarters, visited Aberdeen Proving Ground to discuss with appropriate personnel the problem of effective procurement support of LWL. Based on his inquiry into this problem, General Miley instructed the Chief of the APG Procurement Division to use letter contracts where appropriate and to explore all other provisions of ASPR and APP leading to improved procurement lead time. General Miley felt that LWL should establish a focal point within the Laboratory for procurement actions; this the Laboratory accomplished. Further, the Laboratory proposed to institute a series of formal in-house training courses for more effective orientation of the technical staff in procurement management. A series of three, 30-hour, in-house training sessions by Harbridge House, in conjunction with Rensselaer Polytechnic Institute, was conducted for the Laboratory technical, administrative, and military staff.

The above sequence of actions accomplished in good faith by both the Laboratory and the supporting element of APG resulted in a vast'y improved procurement service. The process developed a mutual understanding and communications which existed through the Laboratory's lifetime. While procurement lead time was not always as short as the engineer would have liked, the education and training procedures allowed the LWL technical staff and procurement personnel to jointly address obstacles to contract award.

As in many problem areas, LWL found that the most effective assurance of short lead-time, quick-response procurement support was to provide to the procurement personnel a contract-request package carefully and thoroughly prepared and fully coordinated. In short, the experience developed no shortcut or panacea, but proved that acceptable, reasonably short procurement lead time could be obtained where the intent of the parties involved was honestly presented and all reasonable actions to avoid procurement obstacles were taken.

In addition, whenever shortcuts could be found to expedite post services, these were quickly implemented. For example, turning again to the procurement example, although the Aberdeen procurement office was just across the street from LWL, there were several approvals required in the processing of a procurement request, starting with post suppl, to be sure the item was not in stock. If the request were put in the post mail on its trip through these approval channels, by the time it waited its turn in several baskets, it could actually be a matter of weeks until it was approved. Days, and even hours, were critical to LWL.

Thus, LWL used a courier to handcarry all procurement requests through channels. The courier would either wait for processing of the request or set a time when he would return to pick it up, depending on the urgency of the request. In any case, each office in the process was made aware of the urgency of each request as it was processed. This may not have won popularity contests for LWL, and particularly its couriers, but it did wonders for speeding up a slow, cumbersome process.

Another bottleneck, not related to post support, but illustrative of LWL's penchant to improvise, was the extremely slow and unreliable delivery service to Vietnam. LWL discovered there were Air Force flights to Vietnam from nearby Dover AFB. Although passengers, as such, were not allowed on these flights, couriers were. So material of an urgent nature was sent via courier on these flights. Even with material that was mailed to Vietnam and which did arrive without undue delay, delivery time there could be prolonged. Therefore, LWL plastered all packages with large red "LWL" stickers so that the liaison officer could quickly identify them among incoming deliveries.

A continuing problem with post support that was never resolved was the steadily increasing cost of this service and the growing bureaucracy surrounding it. The Intraservice Support Agreement, which outlined the contracted services, grew from a simple two-page agreement to a collection of nearly incomprehensible forms, while the cost of services rose from $137,224 in FY 63 to $890,000 in FY 74. This latter figure represented about 17 percent of the total LWL budget, a figure that was becoming completely unacceptable. In addition, the cost of engineering services, for example, covered only the routine services. Cost of specific items, for example, building a rice paddie for tests, would be additional. Even though the cost of services had become prohibitive, LWL with its limited authorized manpower, had no way to counter this trend by attempting to perform the same services in-house. In most cases it was completely impractical to try to duplicate post services that could operate much more efficiently serving an entire post than they could serving a single small agency. Had the LWL operation continued, this is a problem that would have required a solution. Since LWL did not continue in operation, any solution at this point would be only speculative. Certainly it is a constraint that any future laboratory similar to LWL would want to seek to avoid in its planning.

Organizational Simplicity

The organizational structure of LWL, as originally conceived, centered on a progression from applied research in one primary division to development engineering in another, with military input contributing to the requirement, to the evaluation of hardware, along with the Executive Office and the Technical Support Division contributing to the support of the developmental effort. This organization was simple and logical but when the distinction between the efforts of the Research Division and the Development Engineering Division did not materialize, the clear delineation of functions ceased to exist.

Throughout the remainder of the life of the Laboratory the nature of work performed in the various branches became more a matter of individual talents and unwritten ground rules than it did a matter of formal delineation of functions. At a certain level it could be clearly stated that the two development divisions represented the productive elements of the Laboratory; the Military Operations Division represented the customer in the sense of expressing a need and then determining to what extent it was satisfied; and all other elements of the Laboratory were in support of these central activities. Despite this apparent blurring of organizational lines, the Laboratory management found the organization to be simple and relatively easy to manage. Span of control was reasonable and there were no unnecessary supervisory layers and no excess of overhead; in fact, throughout its life the Laboratory operated on an extremely austere basis. This proved to be a handicap as it became necessary to reduce the force in the final years; there was little or no fat to trim off and the professionals began to figure in the reduction in force very early in the process.

Contributing largely to the organizational simplicity was the fact that each project was customarily assigned to one project engineer for the entire life of the task and for all aspects of the R&D involved. The project engineer evolved some or most of the concepts himself. He made the original sketches or formulations, performed the necessary experiments leading to a reduction to practice, supervised the construction of a breadboard, made improvements and preliminary tests, supervised fabrication of one or more prototypes, supervised its testing, aided in its production engineering and in quantity production, and even, when appropriate, accompanied it to Vietnam for

a first-hand assessment of its performance in the field. The project engineer was aided in many of these steps by other LWL personnel and sometimes by contract personnel, but it was always clear to him that he alone was responsible for an item's ultimate performance. He didn't "unload" it (together with his responsibility for its life behavior), after making a prototype, to a production design engineer who would provide his special contribution to the item and in turn, relieved of further responsibility, pass it on to still another individual or group for production of the item. Each LWL item had a straightforward lineage - there was only one "father" anywhere in the "family" chain.

The project engineer's superior was thereby able to retain the necessary technical and monetary control over any given project through the one man who knew most about it and the one man who, more than any other, wanted it to succeed. The average span of control for the chiefs of the R&D branches was less than seven individuals. To repeat again a most important point, the chain of command was short: the project engineer had a Branch Chief and a Division Chief between himself and the Commanding Officer and Technical Director. Most project engineer problems were undertaken and the decision made on the very day they were brought up. Most project engineers preferred to have a prompt decision from management, even though negative, if that decision was made fairly and logically following a full hearing of the facts, rather than be subjected to an indeterminate answer, the "maybe", which might drag on for months and destroy project momentum. This was the organizational climate at LWL.

One important organizational factor was that LWL had direct access to its "customer", the forces in the field. Much of this access was provided by the Military Operations Division which, including as it did some technically knowledgeable Army officers, provided a good "impedance match" with the users in the field.

Multidisciplinary Aspects

It was understood at the outset that LWL was to be both quick reaction in nature as well as multidisciplinary in character. Not only were the Army's materiel problems for limited war to be solved within the nominal 18 months R&D time period, but materiel problems of any nature and classification relating to limited war were to be within LWL's capability.

The initial structure of LWL reflected this need, and it is clear from the original organization chart (Figure 2) that LWL was to be truly multidisciplinary.

In order to blanket all technical areas, LWL staffed its branches with mechanical, electrical, chemical, sanitary, and aeronautical engineers; chemists; physicists; a botanist, biologist, zoologist, geographer, anthropologist, physiologist, and operations analyst. The initial staff totaled 45 technical and scientific personnel, 25 administrative and clerical personnel, and six officers. In addition, many individuals had double expertise: an electronic engineer who was skilled in navigation and shipbuilding; a biologist who was also an expert meteorologist; a physicist who was competent in the application of photography; and a survival equipment engineer who was encyclopedic in his knowledge of much of Asia.

Obviously the knowledge of 45 technical and scientific personnel, regardless of how carefully selected, was minuscule in comparison with the whole of the technology and science within which they were to seek solutions to problems of materiel. No laboratory of the small size and wide diversification of LWL can survive on its own; it must live with and off a number of larger, specialized, competent organizations. LWL did this in several ways.

As stated under "Personnel Selection", LWL personnel had been recruited from numerous Government laboratories and commercial organizations where the LWL personnel had established their roots. This provided them with access to the knowledge and opinion of literally thousands of experts in virtually every technical and scientific area. LWL personnel maintained their contacts with these experts, drawing upon them, and on their associates in turn, through personal visits and by telephone, when specialized and complex problems arose in connection with their R&D projects. On occasion, a specialist from another Army laboratory would be assigned to LWL for a short period of time to aid with such projects. At other times, experts from universities would be taken on as consultants to guide the course of an experiment and to aid in evaluating results. Also of immeasurable assistance were four Australian Army officers who served at LWL on an exchange basis for about 1 year after completing courses at the Army Signal School. A British civilian scientist also spent about 4 years at LWL.

Another source of expertise was provided through the service contract (discussed earlier under "Contract Services") for each Branch which acted to extend its technical scope and experimental facility. Because these contracts acted as extensions to LWL's talents and facilities, they speeded the design, fabrication, and test of some materiel in a way that could not have been achieved otherwise.

The Technical Support Division was the in-house source for design, drafting, fabrication, assembly, and preliminary test. It was customary for LWL engineers to work alongside a machinist, model maker, or welder during the construction of a device; to take it to a nearby test location, such as that at Spesutie Island; return within the hour for a change in hole size, frame structure, or wiring; return to the test site for more experimental data; perhaps repeat the entire procedure a second or third time in a single day; and thus arrive at an early solution to a design problem.

The cross-fertilization provided by this mixture of people knowledgeable in so many technical areas and scientific disciplines contributed greatly to the swiftness and success with which LWL met its development goals. Brainstorming sessions with the participants, hand picked from the staff for their specialized or general knowledge and for their imaginativeness, were particularly fruitful. The brainstorming session that preceded the assignment of a battlefield illumination project produced in a single morning not only the approach which was successfully employed, but in addition a half dozen more having varying degrees of merit.

Training

As already noted, within about 10 months of activation, LWL was fully staffed, with the exception of two civilian positions. As also noted, the selection criteria and the manner in which personnel were selected ensured a high probability of technical and administrative excellence. However, there were two principal deficiencies related to staffing that were recognized, but which could not be immediately resolved.

First, technical and supporting personnel were being hired simultaneously with the development of the technical program, which had to be implemented rapidly. These personnel came from various Governmental and industrial laboratories

where procedures and policies on delegation of responsibility varied considerably. Accordingly, it was difficult and time consuming to attempt to weld together a smoothly operating team from among a group of people who were relative strangers. This was further complicated by the fact that many of the people were accustomed to grabbing the ball and running, while others were more inhibited about taking the initiative; the policies at their previous positions did not condone unilateral freedom of action at the working level.

Second, the assigned military personnel were all combat arms officers (with the exception of the Laboratory commander who was an Ordnance Corps officer). Although all had had some exposure or training in R&D, they were not accustomed to working closely with R&D career civilians, who were more concerned with the technical aspects of military items than with operational aspects. It was frequently difficult for the two to communicate effectively.

The need for a program designed to conduct maximum training on the job was clear. But the accelerated development and implementation of the technical program precluded the training of personnel away from the Laboratory, even on an individual basis.

Many formalized and preplanned procedures for on-the-job training were examined. It was soon found that a workable formula consisted of delegating maximum responsibility downward, encouraging maximum communication between people and between organizational elements within the Laboratory, thus creating an atmosphere within which differences of opinion on civilian/civilian, civilian/military, and technical civilian/administrative civilian interfaces could be resolved at a working level rather than by direction from above. This was facilitated by the fact that the Branch and Division chiefs were all "old hands" with many years of demonstrated managerial expertise. This approach was quite satisfactory and proved to be a valuable and effective procedure in enabling the fledgling technical program to be implemented with minimum delay.

The need for more formalized training programs was recognized, but implementation had to be deferred to a more opportune time. By the end of the third-quarter FY 63, a vigorous effort was initiated for training Laboratory personnel in technical, managerial, and operational areas. This effort included short courses at universities and research centers in specific physical and biological sciences and engineering, as well as at Government installations

where stress was placed on supervisory, administrative, and managerial aspects. In addition, workshops were conducted at the Laboratory in specialized fields. As discussed, Rensselaer Polytechnic Institute was awarded a contract to present a 6-week course in Department of Defense procurement; every professional individual (with one exception) took this course and profited by it, as was demonstrated by the quality of subsequent contract documents. Another contract was awarded to the local Harford Junior College to present a course in elementary electronics at the Laboratory.

Each Division was also responsible for developing a training plan under the provisions of LWL Directive No. 35 (Exhibit 14, Appendix A). This plan was submitted to the LWL Training Officer on an annual basis and every effort was made to abide by it.

In addition to the many short courses and workshops, the Laboratory training policy included providing support toward academic degrees to professional civilians. Two members of the Laboratory received their bachelor's degrees in this manner (in psychology and physics, respectively) and another received his Ph.D. in physics.

The number of people who received training during the lifetime of LWL was fairly high, despite the fact that no two members of a Branch were permitted to be away for training at the same time. Although the people received training in a variety of areas, emphasis was placed on the professional and technical categories. Tables 2 and 3 illustrate the training received by LWL personnel during the period FY 69 through the third quarter, FY 74.

Additional training sources included attendance at scientific meetings and symposia and membership on various committees and panels. Further, the Laboratory subscribed to approximately 200 technical and nontechnical journals and periodicals, which were available in the LWL library.

One of the best training experiences for the LWL technical personnel was his exposure to military operations in Vietnam. Each task officer was encouraged to take his item(s) to Vietnam in order to observe the operational utility firsthand, as well as to assist in evaluation and maintenance. In addition, all Division and Branch chiefs, as well as higher level technical civilians, were encouraged to serve a 3-month tour in Vietnam as the LWL Liaison Officer. As the result of this experience, the technical task officer very quickly learned what the LWL military operations officer was preaching, i.e.,

TABLE 2. TRAINING - FY 69 THROUGH THIRD QUARTER FY 74

	Number of Personnel/Hours				Total Personnel/Hours
	Professional[a]	Technical[b]	Management[c]	Other[d]	
FY 69	16/788	10/140	4/156	14/801	44/1885
FY 70	8/384	28/1511	10/274	11/344	57/2513
FY 71	16/1871	29/1670	6/269	13/348	64/4158
FY 72	23/1979	9/395	7/245	6/158	45/2777
FY 73	14/2791	14/629	8/388	21/559	57/4367
FY 74[e]	9/701	7/300	2/54	12/239	30/1294

(a) Physical Sciences
(b) Trades, crafts, procurement, comptroller, personnel, ADP
(c) All management courses
(d) Safety, communications, secretarial, etc.
(e) Through third quarter FY 74.

TABLE 3. PROFESSIONAL AND TECHNICAL TRAINING HOURS VERSUS MANAGEMENT AND OTHER HOURS (BY FISCAL YEAR)

	Training Hours	
FY	Professional and Technical	Management and Other
69	928	957
70	1895	618
71	3541	617
72	2374	403
73	3420	947
74[a]	1001	293

(a) Through third quarter FY 74.

technical suitability was meaningless without operational suitability and that operational suitability was based on such things as simplicity of operation and maintenance, reliability, small size and weight, etc. It was amazing to compare the scientist's approach to a problem before his trip to Vietnam with his approach to the same type of problem after his return to the Laboratory.

Roles and Responsibilities of Personnel

The roles and responsibilities of the management personnel (Branch Chief and above) are reflected in the functions of the various organizational elements of the Laboratory and in the duties of the chiefs of those organizational elements (LWL Directive No. 2, Exhibit 6, Appendix A). It may be noted that these duties are in no way unique and that they are actually quite similar to the duties of comparable managerial personnel in related Governmental and/or industrial laboratories. In actual practice, however, there were some differences between the duties of LWL managerial personnel and their counterparts in other R&D facilities; e.g.,

(1) LWL Branch Chiefs were "working" managers in that they each carried at least one technical task in addition to their supervisory duties.

(2) LWL managerial personnel worked under considerable pressure in that the Branch Chief was responsible for an average of 10 to 20 technical tasks and the Division Chief directed a program consisting of well over 50 technical tasks. The resultant mix of technical and administrative problems involving decisions and recommendations on budgeting, programming, scheduling, planning, etc., together with the day-to-day problems of the technical manager made for considerable pressure. This was compounded by the fact that U. S. Forces in Vietnam were busily engaged and imposed deadlines in many instances which were difficult to meet.

The key to the successful operation of the Laboratory was the scientist/engineer task officer. Management was quick to recognize this and did everything possible to create an atmosphere in which the task officer could do his work with maximum support and minimum interference. One effective technique for ensuring that the task officer's enthusiasm would continue to be maintained at a

high level was to establish the policy that he was responsible for his item from conception to transfer to the AMC parent agency for production. Every effort was made in this regard. However, it was interesting to note that in those few instances where it was considered necessary to transfer responsibility for a task from one Branch to another, the task almost always proved to be unsuccessful.

Maximum responsibility was delegated downward to the task officer. He spoke for the Laboratory in every sense of the word and was completely supported in his decisions.

Travel by the task officer was encouraged, particularly to contractors' facilities. It was believed that only by constant discussions and "eyeball" working sessions with his contractor would the probability of success be high.

Communications within the Laboratory was encouraged. This was enhanced and augmented by the fact that each professional person had a working knowledge of at least one technical discipline in addition to his primary one. Another effective method of assuring and encouraging communications within the Laboratory was to arrange the various offices and working laboratories in pairs, as discussed under "Facilities". Since these "pairs" had similar programs, they were thus encouraged to avoid rivalry and work together. A tangible realization of this arrangement was the fact that they could and, in fact, did share not only expensive instrumentation and equipment but could easily exchange ideas and concepts as well.

The Branch laboratories were utilized to a large extent for various investigations under the Generation of New Ideas (GNI) program to be described below. It was not unusual to find a task officer completely engrossed in an experiment long after working hours. The various Branch laboratories were also utilized for conducting preliminary technical investigations prior to the preparation of contract requests. In so doing, the task officer was able to (a) establish the technical feasibility of a proposed task, (b) obtain preliminary quantitative data upon which to base the contract work statement, (c) prepare contract documentation which was highly specific in its objective, technical approach, and description of the required hardware, (d) provide intelligent technical guidance to the contractor, and (e) put himself in the best possible position to evaluate both the contractor's product and performance.

Tasks were normally assigned to the task officer who conceived the idea and recommended the task even though, at times, it did not fall within the purview of his Branch. It was reasoned that his interest and enthusiasm were major prerequisites to success, and that he would seek out technical support from elsewhere in the Laboratory to augment his own technical capability, if so required.

The task officer attended all tests of his item no matter where they were conducted. Most of the field tests were conducted at LWL or TECOM facilities at APG. However, it was frequently necessary to test developmental hardware at various other geographic locations because of the availability of required types of terrain, meteorological conditions, etc., at those locations. Accordingly, many tests were conducted in the Canal Zone, Puerto Rico, Philippine Islands, Alaska, Vietnam, Thailand, and in many areas within the United States, e.g., Yuma Test Station, Everglades National Park, Ford Ord, Fort Huachuca, Fort Bragg, etc. In this connection, all LWL scientists/ engineers had special orders which authorized them to fly in all types of military aircraft. Further, most professional personnel had valid, up-to-date passports and immunization records which permitted them to travel outside the continental limits of the United States on short notice.

As has already been mentioned, a tour in Vietnam either as the LWL Liaison Officer or for purposes of introducing an item of hardware to U. S. Forces was no novelty to the LWL scientist/engineer.

In addition to all of his technical duties, the task officer was also required to keep up with his expenditures and have a working knowledge of procurement, budgeting, programming, contracting, etc. Matters relating to contracts represented a great portion of the LWL task officer's activities since, as has already been pointed out, a substantial number of contracts were required by the LWL program.

The task officer prepared the contract document, including the scope of work, funding estimates, schedule, etc. To do this, he attempted insofar as possible to be specific and clear and to avoid misunderstandings and misinterpretations on the part of the contracting officer and the contractor. The draft contract document was routed to the various LWL divisions for their input/comment and was then prepared in final form and forwarded to the pot Contracting Officer. The task officer played a principal role during the

contract negotiation phase, attending many discussions, panel meetings, site surveys, etc., and doing what was necessary to facilitate the rapid award of the contract.

Once the contract was in effect, the task officer was encouraged to visit the contractor at least once per month. Similarly, the contractor's principal investigator was encouraged to visit LWL once per month. In this way, maximum communication could be effected and problem areas identified before they became serious.

Evaluation of the contractor's performance was conducted by the task officer, and he recognized this as an important responsibility. There were no committees, panels, etc., to diffuse the responsibility. The task officer, working under the aegis of the Contracting Officer, was the one who gave approval for the next contractual step or phase based on his evaluation. The task officer also attended all tests and demonstrations of the equipment/hardware, participated/conducted all briefings, learned to operate and maintain the equipment, assisted in the preparation of maintenance and instruction manuals, assisted in the operational evaluations of the hardware in Vietnam or other operational areas, approved contractor reports for publication, and served as the first echelon watchdog on funding, etc., to attempt to prevent overruns.

As may be noted, the duties and responsibilities of the LWL task officer were many and varied. However, with the support of the various organizational elements of LWL augmenting his own initiative, drive, and proficiency, it was not unreasonable to anticipate success.

OPERATIONAL PHILOSOPHY

From the time of its activation, the first step in any LWL program was the identification of a military need for a method or device to solve a specific operational problem. This was explicit in the LWL mission. The basic philosophy by which LWL operated required that it be continuously attuned to the real needs of units and individual soldiers in field operations as they arose and that it react quickly in meeting these needs. It should also be stressed at this point that a major difference between LWL and other Army R&D laboratories was that, with OCRD approval, LWL was permitted to work on tasks that did not, at the time of their initiation, have a validated requirement. These tasks were in response to specific field problems; the point being - LWL worked on needs, not formal validated requirements; however, the original charter provided that a draft requirement document be initiated as soon as practicable. This provision was followed literally in the first days of LWL, but then when it proved to be too much for the receiving Combat Developments Command, the practice was dropped completely. It was reinstituted on a selective, controlled basis in 1971 when it became apparent that the requirement document was one key to continuation of a task by an AMC Commodity Command. (Exhibit 15, Appendix A contains a discussion of operational philosophy from a somewhat different standpoint. This document, updated periodically, was widely disseminated from 1971 to 1973 as an educational vehicle.)

Source of R&D Tasks

When LWL was activated in June 1962, an initial step in formulating an R&D program was the submission of inquiries to all components of the Army Materiel Command seeking information on then-current tasks with application to limited war. Inquiries were also directed to Navy and Air Force installations and a number of laboratories were visited to obtain more detailed information. Industrial proposals for R&D related to limited war were also solicited and evaluated.

The Special Doctrine and Equipment Group at Combat Developments Command (now TRADOC) was contacted to obtain all known requirements. Other requirements were suggested both internally and by other outside sources. From this survey,

130 proposed requirements were grouped into technical categories and assigned to the appropriate LWL research branch for evaluation and possible inclusion in the initial LWL R&D program. It is significant that about 75 percent of these proposed requirements were generated within LWL. As will be discussed later, the identification of requirements by LWL personnel was an important part of the operational philosophy and a continuing source of R&D ideas.

The initial LWL R&D program consisted of some 35 tasks carefully selected as a result of the evaluation of the 130 proposed requirements.

The basic philosophy and approach by which LWL formulated its initial R&D program was continued through the years. There were actually five basic sources for identifying operational needs, as discussed below. More specific details of LWL's relationship with other laboratories and a specific idea-generation program follow that discussion.

One source from which R&D needs were identified was the various Army requirements documents. These included QMR (Qualitative Materiel Requirement) and SDR (Small Development Requirement) documents approved by the Department of the Army and assigned to LWL for development. These also included quick-reaction requests from commanders in the field. Department of the Army approval and assignment to LWL was required on these documents. In later years, these took the form of ENSURE (Expedited Non-Standard Urgent Requirements for Equipment) requests, which went directly from USARV headquarters to the Department of the Army, Assistant Chief of Staff for Force Development, and then to OCRD for assignment to a developing agency.

A second source was directives from OCRD for development of identified needs. These were in addition to the requirements documents discussed above.

A third, and very vital source, was in-house generated ideas. The importance of this source in the original R&D program has already been discussed. Later a specific program (Generation of New Ideas) was formalized to tap this source. The GNI program is discussed in detail later. Beyond this formal program, LWL engineers and scientists were in constant contact with other agencies, with industry, and even with combat units in the normal execution of their tasks and were always ready to recognize additional needs.

Perhaps the most important source for identifying needs was the use of liaison officers. Since quick reaction to operational problems was the reason for LWL's existence, quick identification of these problems was essential. However, field units were either unaware or skeptical of LWL's unique capability, and quick-reaction requests from units in the field were few at first. Thus,

the liaison officer concept was conceived. LWL sent its first liaison officer to Vietnam in April 1963, and had someone there for the duration of the conflict. The liaison officer, originally a civilian, had a 3-month tour of duty and two principal functions. First, he was to demonstrate the latest developed items to field commanders and make current LWL developments known to units in the field. Second, he was to observe firsthand the current needs of combat units and keep the Laboratory informed on a day-to-day basis. Thus, critical needs for which no formal requirement had been stated were identified. Often the liaison officer could identify needs that the field forces were unaware of because they were busy fighting, while he could study the situation with the objectivity of noninvolvement. That such needs were real would be aptly demonstrated by the enthusiasm with which subsequently developed items were accepted.

It was later found best to alternate civilian and military liaison officers in the interest of maintaining the best relationship with the military commanders in the field. The civilian liaison officers generally provided the best representation from a technical viewpoint; not being indoctrinated in the "Army way", they could bring a fresh viewpoint to problems and offer workable solutions that might never have occurred to military personnel. But because they did not know the Army way, they sometimes ran into problems with military protocol and their understanding of military operations. Sending a military representative for the next 3 months could serve as a buffer, and the military officer was also often able to better relate to the actual operational problems. Whether military or civilian, the liaison officer spent his time talking with those fighting the war -- out in the rice paddies, riding in helicopters, etc. From this close contact with the war, he was able to feed notes and sketches back to LWL, even get on the phone when necessary, and LWL knew, almost from day to day, where its talents were most urgently needed.

In addition to the 3 months in Vietnam, the liaison officer would normally spend 3 to 4 days in Korea enroute and would spend a week or so in Thailand during his stay. In order to make these tours as profitable as possible, LWL had agreements with ARPA, ACTIV, and USARV regarding liaison activities. A liaison officer was also sent to Fort Hood, Texas, and to Alaska for 6 weeks each summer and 6 weeks each winter. In addition, there were visits to USAREUR Headquarters, the Middle East, and South America of a liaison nature. The LWL Directive related to Liaison officer activities is included as Exhibit 16, Appendix A.

The fifth and final basic source for identifying needs was the unsolicited proposal. It has been said that when a new laboratory opens, every feather merchant in the country comes running; LWL was no exception. However, LWL did not look on this as an annoyance but as a very positive, potential source of important R&D programs. A formalized procedure was established for processing and carefully evaluating all proposals. (A copy of LWL Directive 9 on this subject is included as Exhibit 17, Appendix A.) The focal point for handling industrial proposals and assuring their coordination throughout the rest of the Laboratory was the Research Analysis Office. As a result of this program, approximately 2 percent of all unsolicited proposals received at LWL were funded. Although this figure does not seem very high, it is considerably above that of most other laboratories.

Relationship With Other Government R&D Laboratories

Initially, the formal relationship between LWL and a number of the Army Materiel Command (AMC) laboratories was cool; a condition which resulted from two facts: LWL was regarded as a competitor and LWL had proselytized some top-ranking people from these laboratories. However, the informal relationship was generally good; the resulting interchange of information and the cooperation at the engineer level contributed significantly to the success of many LWL projects.

As LWL's programs matured, a number of projects required quantity production of certain materiel. LWL sought out those AMC laboratories best suited for the production aspects, cooperated with them in the production contracts, and in some cases transferred from its own budget to these laboratories or "parent agencies" the monies necessary for the production run. This type of interrelationship was favored by a number of the AMC laboratories, with the result that their formal relationship with LWL became more friendly.

The LWL relationship with laboratories other than AMC achieved significant levels and a number of projects involved groups in the Navy, Marines, and Air Force. With some projects, such as a surgical light for operating rooms, LWL enjoyed the cooperation of the Army Medical Corps.

LWL also had in its charter authority for direct contact with Department of the Army staff elements, other Army R&D agencies, USCONARC, USACDC, USAF, USN, USMC, MASSTER, STANSM, OPMG, ASA, Corps of Engineers, TSG, and overseas commands on matters pertaining to R&D efforts within the assigned LWL mission. This authority extended, as necessary, to direct contact in the execution of tasks for DCPG, Department of Justice, and ARPA.

Generation Of New Ideas (GNI) Program

The process utilized by LWL for the selection of highly professional (scientific and engineering) personnel has already been described. It may be noted that the type of individual given preference could be characterized as follows:

- Technically proficient and up-to-date in his field
- Knowledgeable and up-to-date in at least one other field
- Enthusiastic, highly motivated, high initiative
- Unconventional in his thinking
- Willing to endure hardships and inconveniences in order to achieve his goal
- Willing to be a proponent of unpopular or "unfeasible" principles and concepts requiring hard work to prove their validity
- Willing to "try" things even if the odds for success were small.

It was ascertained almost immediately after organization of the Laboratory (by the end of the first-quarter FY 63) that many of the personnel were so unconventional and highly motivated as to be perfectly willing to "bootleg" a pet idea in order to satisfy themselves as to its validity. Their ultimate goal of course was to propose a formal task, but to do this a brief prior investigation was required for which there was no approved mechanism. Accordingly, a mechanism was devised by the Technical Director and Division Chiefs, and approved by the Laboratory commander, which "encouraged initiative and provided the professional staff a means for individual inquiry and investigation on a less formal basis than the Task Approval procedure". This mechanism was designated as the Generation of New Ideas (GNI) procedure.

Later on, not only were GNI [illegible] at the initiative of the individual scientist or engineer, but the procedure was broadened to include responses to technical inquiries posed by higher headquarters (OCRD), Army field units, and others, provided the effort required was of small enough magnitude to fall within the scope and provisions of the GNI procedure.

Description

Although the GNI procedure per se was straightforward and quite obvious as to its aims and goals, it was considered to be unique among the community of military R&D laboratories, having features not common to the independent R&D effort normal to most laboratories. This was noted again and again during meetings, briefings, etc., where a description of the GNI procedure invariably evoked enthusiastic comment on the part of the audience.

The GNI procedure was fairly simple and could be described as follows:

Initiation. Any technical member of the Laboratory could propose the establishment of a GNI task. He was required merely to execute Form No. CRD-AM-1011 which was a one-page form that included the proposed title of the task, date of initiation, organizational element, estimated cost, and a brief description of the investigation to be performed. It was required that no more than $2,000 be allocated to any single GNI task (although, in several instances, a small amount of additional funds was made available if required to complete the investigation and in 1972 the limit was raised to $3,000).

Approval. The only approval required was that of the Branch Chief. The approved Form No. 1011 was then routed to the Executive Office (later, the Program/Operations Division) for assignment of funds and filing. Each Branch was authorized to obligate an amount not to exceed $20,000 per fiscal year nor to exceed $2,000 (later $3,000) per individual task. Neither the Division Chief, the Technical Director, the Commanding Officer, nor any other individual or organizational element of the Laboratory had approval authority on a GNI task.

Execution. The individual initiating the task was solely responsible. He could utilize the funds (without additional authorization) for salary, materials, shop time, travel, equipment, contract, tests, transfer to another Government facility, or in any other way that seemed to him to be appropriate. He could work on the task at his own pace and was not required to report on its progress at any time. However, if the task was still in effect for a period of one year, he was encouraged to complete it or terminate it.

Evaluation and Reporting. Each task officer evaluated his own work with the realization that he had to be as objective as possible. This was not too difficult in those tasks where technical data had been accumulated. Although it was realized that a scientist evaluating his own work could not be entirely objective, it was encouraged nevertheless. The aim was to avoid having the task officer advertise his failures, since it was reasoned that this might discourage him from initiating high-risk efforts in the future.

When the GNI task was completed, the task officer prepared a one-page report which summarized the investigation and which contained his conclusions. Simultaneously, the task officer prepared a stop order to prevent further charges. Both documents were routed to the Program/Operations Division. At this point the task officer had the option of recommending the establishment of a formal task (if the results of the GNI task so warranted) by executing the standard Task Approval Form CRD-AM-1003 (discussed under "Plans and Programs"). Or, if the GNI task were unsuccessful, he could quietly forget it and not have to worry about being held accountable for expending funds on an unprofitable venture. When the standard Task Approval Form was executed, the proposed task competed for approval and support with all of the other tasks of the Laboratory requiring resources.

Statistics. Table 4 shows the total expenditure of GNI funds by fiscal year:

TABLE 4. U. S. ARMY LAND WARFARE LABORATORY GNI FUNDING

FY 74	$ 52,488
FY 73	110,330
FY 72	110,174
FY 71	113,680
FY 70	105,963
FY 69	74,220
FY 68	94,270
FY 67	74,851
FY 66	73,395
FY 65	34,365
FY 64	44,413

It may be noted that although the maximum authorized enpenditure was $140,000 per year, this figure was never reached, much less exceeded.

The total number of GNI tasks and their varied nature is shown as Exhibit **18,** Appendix A. An internal study conducted at LWL in 1970 to attempt to assess the validity and the worth of the GNI program showed that of 432 GNI tasks undertaken, 107, or approximately 25 percent, resulted in the establishment of formal tasks in the Laboratory technical program. Further, of 152 items sent to RVN for evaluation, 45, or about 30 percent, were the result of GNI-initiated tasks.

FUNDING

During its 12 years of operation, LWL received more than $95 million in funds; a complete funding record is shown in Table 5, page 65. An annual breakdown of the OCRD-AMC funding is given, and all funds received from other sources are shown. This outside funding amounts to about 11.5 percent of the total and illustrates the importance of augmenting the budget in operating a laboratory of this type. Obviously, LWL would not have been able to maintain the same level of effort or diversity of staff without such outside funding.

Additionally, there were three other important sources of funds that do not show separately on the table, but which are included in OCRD funding. There were PROVOST, ENSURE, and Emergency funds, accounting for 15 to 20 percent of the total funding. The PROVOST program (Priority Research Objectives for Vietnam Operational Support Tasks) was a DDR&E mechanism for providing high priorities to Southeast Asia-oriented R&D efforts. LWL funding under PROVOST is summarized in Table 6. It was this substantial PROVOST funding in FY 66 that resulted in the Laboratory's major expansion as total personnel increased from 86 to 145 in that one year. A letter from DDR&E describing this expanded PROVOST budget and its purposes is included as Exhibit 19, Appendix A.

TABLE 6. PROVOST FUNDS RECEIVED BY LWL

FY 66 Supplemental	$2,906,000
FY 66 Emergency	5,000,000
Chemiluminescence Hand Grenades	35,000
Road and Trail Interdiction	640,000
Total	$8,581,000

Procedures for Expedited Nonstandard Urgent Requirements for Equipment (ENSURE) was a Department of the Army answer to the need for quick reaction to meet priority requirements in Southeast Asia. LWL received ENSURE support for

TABLE 5. TOTAL FUNDS RECEIVED BY LWL - ALL SOURCES[a]

Fiscal Year	AMC	OCRD	ARPA	Air Force	Navy	CDC	Other Army	Other Agency	Total
FY 63	$	$ 4,062,291	$ 208,500	$	$	$	$	$	$ 4,270,791
FY 64		5,147,175	133,880					6,000	5,287,055
FY 65		3,997,816	50,790				640	34,268	4,083,514
FY 66		13,189,386	196,500				29,924		13,415,810
FY 67		6,969,517		64,700	16,018		108,360		7,158,595
FY 68		10,668,398	128,100	852,937	1,702,607		568,350	464	13,920,856
FY 69		8,081,026		200,500	359,200	270,213	51,981		8,962,920
FY 70		8,344,558	1,855		123,983	464,500	364,144	81,425	9,380,465
FY 71		6,395,337			51,343	449,164	259,397	186,703	7,341.944
FY 72		7,015,000			78,500		638,340	1,205,940	8,937,780
FY 73		6,360,400		103,366	25,000	884	658,326	107,000	7,254,976
FY 74	4,093,000				60,000		170,094	825,094	5,148,188
	$ 4,093,000	$80,230,904	$ 719,625	$ 1,221,503	$ 2,416,651	$ 1,184,761	$ 2,849,556	$ 2,446,894	$95,162,894

(a) Average Per Year Since Inception:

OCRD & AMC funds	$ 7,026,992
Other Funds	903,249
Total Funds	$ 7,930,241

many programs through the years, but no summary of this funding is available. LWL procedures for expediting ENSURE requests are detailed in LWL Directive No. 25 (Exhibit 20, Appendix A).

Emergency funds come through DoD and are competed for at mid-fiscal year by all three Services for research or development in the "breakthrough" area. With its very mission stressing breakthrough, LWL successfully competed for such funding several times; a summary of the more than $6 million received is shown in Table 7.

TABLE 7. EMERGENCY FUNDS RECEIVED BY LWL

FY 68	Search and Destroy	$2,511,000	
		($756)	Airborne Gunfire Locator
		($705)	Airborne Personnel Detector
		($250)	CS/CN Lachrymator Dispenser
		($400)	FOPEN
		($400)	Vapor Surveillance
FY 69		$1,030,000	
		($280)	Riot Control (11 tasks)
		($200)	CLOARD
		($300)	XM3
		($250)	Retransmission Device
FY 70		$1,828,000	
		($400)	Multipurpose Dog
		($428)	Explosive Detection
		($700)	FOPEN
		($300)	Improved Position Locator
		$ 455,000	
		($305)	HELNAVS
		($150)	Launcher Improved for Ground Flares
		$ 430,000	
		($400)	FOPEN
		($ 80	Vapor Surveillance

One budget problem encountered, certainly not unique to LWL but perhaps magnified by its smallness and its ability to retain personnel, was that of increasing fixed costs. With constantly rising wages, the percentage of fixed costs to budget rose from 33 percent in FY 67 to 61 percent in FY 74. This is illustrated in Table 8. The rise in wages, which nearly doubled from FY 63 to FY 73, is shown in Table 9. The result of this was that LWL's contractual effort fell from 47 percent of budget in FY 67 to about 21 percent in FY 74. With the budget steadily decreasing from its peak in FY 68, it is obvious that LWL's ability to accomplish its mission was hindered by the steady rise in fixed costs.

TABLE 8. LWL PROGRAM/BUDGET (in thousands of dollars)

	FY 67	FY 68	FY 69	FY 70	FY 71	FY 72	FY 73	FY 74
FIXED COSTS								
Indirect Labor	803.5	819.9	928.4	1,109.2	1,140.1	1,167.0	1,165.0	1,225.0
Indirect (Material, Travel & Transportation)	104.3	147.3	89.4	78.4	76.9	77.0	85.0	95.0
Support	87.9	158.5	47.0	64.4	107.8	174.0	180.0	150.0
Capital Equipment	22.6	34.2	19.4	9.4	17.5	24.0	70.0	50.0
General & Administrative	424.4	588.2	592.8	733.2	766.4	709.0	710.0	720.0
O&M Aircraft	135.9	137.2	193.3	108.5	143.7	180.0	180.0	180.0
Direct Labor	727.4	870.1	893.8	934.5	1,073.8	1,190.0	1,190.0	1,250.0
Total Fixed	2,306.0	2,755.4	2,764.1	3,037.6	3,317.2	3,521.0	3,580.0	3,670.0
VARIABLE COSTS								
Contractual Effort	3,272.1	6,615.2	4,406.4	4,560.9	1,883.8	2,026.0	1,390.0	1,285.0
Direct (Mtl & Sup Equipment)	547.5	670.2	394.6	418.6	388.0	487.0	400.0	400.0
Direct (Travel & Transportation)	169.2	141.8	71.8	94.6	120.0	183.0	180.0	170.0
Other Army, Other Government	680.0	499.1	473.0	251.7	691.0	798.0	450.0	475.0
Total Variable	4,668.8	7,926.3	5,345.8	5,325.8	3,082.8	3,494.0	2,420.0	2,330.0
Percent of Grand Total	66.9	74.2	65.9	63.7	48.2	49.8	40.3	38.8
GRAND TOTAL	6,974.8	10,681.7	8,109.9	8,363.4	6,400.0	7,015.0	6,000.0	6,000.0

TABLE 9. LML COMPARATIVE PAYROLL COSTS

	FY 63	FY 64	FY 65	FY 66	FY 67	FY 68	FY 69	FY 70	FY 71	FY 72	Estimated FY 73
Indirect Regular	244,044	306,531	380,600	449,647	503,249	517,227	562,522	720,643	739,555	733,567	730,000
Indirect O/T	1,265	4,035	487	1,773	302	456	249	602	502	136	-0-
Direct Regular	100,319	321,569	388,907	442,687	726,416	819,647	893,830	869,854	993,322	1,090,854	1,096,945
Overtime	658	1,650	6,507	5,395	970	262	112	-0-	413	7,536	2,000
Work Effort	346,286	633,785	776,501	899,502	1,230,937	1,337,592	1,456,713	1,591,099	1,733,792	1,832,093	1,828,945
Leave	43,044	100,062	120,265	142,708	193,582	234,631	254,343	297,267	312,720	345,156	345,000
Total Wages	389,330	733,847	896,766	1,042,210	1,424,519	1,572,223	1,711,056	1,888,366	2,046,512	2,177,249	2,173,945
Fringe Benefits	26,999	53,633	65,412	79,063	106,408	117,789	127,842	145,373	165,895	181,694	181,055
Cost to Government	416,329	787,480	962,178	1,121,273	1,530,927	1,690,012	1,838,898	2,033,793	2,212,407	2,358,943	2,355,000
Average Number Civilians	38.1	70.4	79.5	92.1	130.3	132.9	129.7	124.8	125.7	125.4	116.0
Average Hourly Rate	4.89	4.97	5.38	5.40	5.25	5.68	6.34	7.27	7.82	8.97	9.76
Average Wage	10,219	10,424	11,280	11,316	10,933	11,830	13,192	15,131	16,281	17,362	18,741
Average Cost to Government	10,927	11,186	12,103	12,175	11,749	12,716	14,178	16,296	17,601	18,811	20,302

PLANS AND PROGRAMS

Program Development

Because LWL was a line item on the RDT&E program of the Army and was included in OCRD's budget submission to Congress, the Laboratory was compelled to comply with standard procedures for submission of program plans and budgets. These procedures required submission of a program plan and budget 18 months prior to the start of each fiscal year. Both LWL and OCRD recognized that this was completely unrealistic considering LWL's quick-reaction mission and the very dynamic nature of the program. Just how dynamic the LWL program was is illustrated by the data in Table 10, which shows carry-over tasks and new tasks for each year beginning in FY 68. It was impossible to know what specific programs would be required 18 months hence. Thus, although complying with requirements, LWL was allowed to adopt special procedures geared to its situation.

The original budget and program submission followed the prescribed format but described, and budgeted for, only functional areas*, not specific tasks. Even this could not be done with any precision, since the emphasis even on functional areas could shift drastically in 18 months. However, this submission was sufficient to get LWL into the OCRD budget.

Actual program planning would not start until January, 6 months before the start of a fiscal year, and a final plan was not submitted to OCRD until mid-May. Details of the program development cycle were:

January: LWL management would analyze OCRD guidance, study trends and changes emphasis in requirements, review lessons learned and intelligence reports, and seek to identify new developments in organization and tactics. From this review and analysis, a picture of the year's program would start to emerge.

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* These functional areas were: Communication (Electronic), Communication (Non-Electronic), Firepower, Surveillance, Survival, Mobility, Denial Operations, Nation Building, Riot Control, and Combat Support.

TABLE 10. LWL PROGRAM ACTIVITY[a]

	Carry-Over Tasks	New Tasks	Total
FY 68			
On Hand - 1 July 1967	102		
Tasks Initiated		72	174
Tasks Terminated	56	15	71
On Hand - 30 June 1968	46	57	103
Average Number of Tasks: 110			
FY 69			
On Hand - 1 July 1968	103		
Tasks Initiated		104	207
Tasks Terminated	65	27	92
On Hand - 30 June 1969	38	77	115
Average Number of Tasks: 117			
FY 70			
On Hand - 1 July 1969	115		
Tasks Initiated		53	168
Tasks Terminated	72	8	80
On Hand - 27 May 1970	43	45	88
Average Number of Tasks: 102			
FY 71			
On Hand - 1 July 1970	88		
Tasks Initiated		99	187
Tasks Terminated	49	16	65
On Hand - 30 June 1971	39	83	122
Average Number of Tasks: 122			
FY 72			
On Hand - 1 July 1971	122		
Tasks Initiated		79	201
Tasks Terminated	69	12	81
On Hand - 30 June 1972	53	67	120
Average Number of Tasks: 129			
FY 73			
On Hand - 1 July 1972	120		
Tasks Initiated		79	199
Tasks Terminated	64	7	71
On Hand - 30 June 1973	56	72	128
Average Number of Tasks: 141			
FY 74			
On Hand - 1 July 1973	128		
Tasks Initiated		36	164
Tasks Terminated	95	10	105
On Hand - 19 April 1974	33	26	59

(a) Expressed in terms of:
- Tasks continued into a new fiscal year
- New tasks started during the fiscal year
- Old and new tasks terminated during the fiscal year.

February: As a result of the January analysis, guidance was furnished to the technical branches and task engineers regarding the trends. Input for the new program year, including funding needs for continuing tasks and proposed new tasks, was requested.

Mid-March: New fiscal-year program proposals were completed by the branches, backup fiscal data were developed and consolidated, and a program package was prepared for study by each member of the LWL Review Board. A sample of the form used by branches for program submission is included as Exhibit 21, Appendix A. The Review Board included the Technical Director as Chairman, and all Division Chiefs.

Early April: The Review Board was convened and a careful review was conducted over a one-week period with emphasis on requirements and state of the art of technical proposals.

Mid-April: The recommendations of the Review Board were prepared for tentative approval by the Commanding Officer. A tentative program was also prepared and submitted to Combat Developments Command for coordination. (Formal coordination was with the Chief of the Special Warfare and Civil Affairs Group, but CDC personnel were also brought in at each decision point in program development.)

Early May: CDC comments were received and analyzed. The Review Board was reconvened to consider these comments and a final review and modification of the program was conducted by the Technical Director and Commanding Officer.

Mid-May: The program was prepared in final form and 10 copies were submitted to OCRD for staffing within OCRD and other interested staff agencies.

Even this submission, of course, was subject to change as other needs were identified throughout the year. Line-item changes up to $200,000 in the LWL budget could be made without approval of the Chief of Research and Development. (This was set at $50,000 in April 1963 and increased to $200,000 in August 1965 when it became obvious that LWL required the flexibility of the higher figure.) This allowed LWL to operate with a good deal of flexibility, a necessity in its dynamic, quick-reaction program.

Actual funding of each task within LWL was accomplished by submission of a Task Approval Form (Exhibit 22, Appendix A). (LWL Directive No. 5, Exhibit 23, Appendix A describes in detail task approval procedures.) The Task Approval Form was required to establish a new task, to acquire additional funds for an established task, and to effect changes in the scope of work. Each task submission required the approval of the branch and division chief, the Technical Director, and the Commanding Officer, with concurrences of the Executive Officer and the Chief, Military Operations Division.

LWL's quick-reaction capability was further enhanced by its exemption from preparation of Formal Technical Development Plans and preparation and maintenance of Research and Technology Reports. Because LWL operated on the basis of low-cost, short-term, highly dynamic tasks, preparation of these reports would have generated a reporting work load completely out of balance with its returns. It was demonstrated to the satisfaction of OCRD that preparation of these reports was prohibitive in time and cost.

Program Execution

A complete review of individual LWL tasks in Appendix B provides an ample description of the scope of LWL research. However, it says little about how LWL executed these various programs. It was implicit in the LWL quick-reaction mission that the emphasis in program execution be on development, not on research. Consequently, one of LWL's most important capabilities was that of taking off-the-shelf items and quickly developing prototypes to demonstrate a particular concept. The first step in executing any task was to determine the state of the art; then, starting as close to the top as possible, develop an item from there. In actuality, this first step was often executed before the task began, because it was part of the LWL engineer's job to be on top of the state of the art. Travel was encouraged in order that LWL personnel could be up-to-date on developments in other laboratories and in industry.

In developing an item, it was obvious that with a staff of about 150 during most of its operation and with limited laboratory facilities LWL depended heavily on contract R&D. The LWL engineer was often cast more in the role of R&D manager, coordinating development and test activities at outside agencies or companies. As noted, LWL facilities were often used more in a

monitoring capacity than for actual developmental work. This not to say in-house programs were not conducted, or that important items were not developed wholly at LWL, but that contract R&D was essential to the quick-reaction capability. The importance of knowing where to go and being able to get quick reaction from industry was vital; the importance of the service contract in this regard has already been discussed. One of the first places contacted was the cognizant AMC laboratory. This avoided duplication of effort and often provided already existing development efforts that could be tailored to the particular need. When getting items into production, very close coordination was effected with the AMC. AMC nominated a parent agency, or in other words a Commodity Command, to prepare the production package, repair parts, and do all the work necessary to put an item into production. LWL carried an item through the Engineer/Service Test, and provided drawings, results of test, and all related information to the Commodity Command. In its last 3 years, effort was made to turn over development to a Parent Agency sooner, generally after engineer design test and a field evaluation. This avoided long, drawn-out formal testing which was wasteful of LWL's limited resources and also got the AMC agency with its talent and resources into the program earlier. The LWL directive on parent agency liaison is included as Exhibit 24, Appendix A.

LWL's actual operation in initiating, organizing, and completing individual R&D tasks can best be described by detailed accounts of particular tasks that seem to exemplify the LWL approach. Two such tasks*, described in detail on subsequent pages, have been selected on the basis that they are illustrative of all or most of the following

- How LWL operated
- Relationship with OCRD
- Contractual relationships
- Test and evaluation procedures
- Pioneering research in an area
- Interest by another Service in the results
- The multidisciplinary approach to research.

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* Although portions of these programs are classified only unclassified material is contained in the task descriptions provided herein.

Tunnel-Mine-Detector Dogs Task

The use of dogs in a limited warfare environment was one of LWL's earliest interests. Under the direction of Dr. Max Krauss, Chief of the Biological Sciences Branch, research on the feasibility of training off-lease dogs for reconnaissance activities was initiated in 1963. A study was performed by Dr. Roger McIntire at the University of Maryland Canine Behavior Laboratory which demonstrated that a free-ranging dog could be quick and effective in patrol operations[1]*. Training procedures were developed and evaluated that allowed these dogs to range from 100 to 200 meters ahead of their handlers. At this range, reading the dog's response became a problem. To meet this, a motion-sensing radio transmitter carried by the dog was developed that enabled a handler to continuously monitor his dog's behavior, even when out of sight.

This feasibility study was followed in 1966 by a one-year program by LWL to train a small number of off-leash dog teams and evaluate their performance in South Vietnam[2]. This program was initially evaluated jointly by the 26th Infantry Platoon (Scout Dog), Fort Benning, Georgia, and the Eglin AFB Ranger Camp; training operations were conducted at both sites. Four dog teams were sent to Vietnam for operational evaluation, and three of them participated in actual combat operations there. The most significant results were obtained in operations with the 1st Cavalry Division where they were allowed to function as intended. Operating off-leash they made at least five, and possibly as many as eight, valid alerts. One of these was most dramatic: the dog, Nick, gave an early warning of an enemy ambush position, which enabled the patrol to disperse three VC and capture their materiel without casualty. The success of these dogs resulted in their operational employment following evaluation and in high-level attention to the program.

Up to this point, LWL had been operating the program to meet identified needs, but there were no stated requirements for the development of mine- and tunnel-detection dogs. In 1966, OCRD began to show an interest in training such platoons. Coincidentally, incidents of booby traps and mines were becoming a very real problem in Vietnam, as were the use of tunnels by the VC. Detection of mines, boobytraps, tripwires, and tunnels

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* References are given on page 85.

took on high priority, and the question of whether dogs could perform this task was posed. As a result, and considering the success of LWL's off-leash work, OCRD directed LWL to develop a platoon of detector dogs for deployment to Vietnam. This was to be a 12-month effort; the first 6 months for a feasibility study, and the second 6 devoted to the organization and training of a platoon, if feasibility was demonstrated.

During the 6-month feasibility study[3], procedures for dog handling and training were developed based on formal studies of animal behavior and reinforcement studies. (John Romba, a psychologist in Dr. Krauss's branch, became an important contributor to the progam at this time and remained actively involved throughout.) The success of Rombo's reinforcement approach, as opposed to other current theories of dog training, was demonstrated repeatedly in the reliability and efficiency of trining. It also allowed the communication of techniques to people without dog experience.

A final demonstration of the results of this feasibility study was conducted at Fort Gordon on July 18, 1968. Those present at this demonstration included members of the Army Scientific Advisory Panel; Dr. Marvin Lasser, the Army's chief science advisor; and OCRD representatives. The results were dramatic as the six dogs detected from 80 to 100 percent of stimuli at the highest level of concealment. These stimuli included one man who remained buried underground for nearly 4 hours on a hot day before the dogs found him! As a result of the successful demonstration, the second phase was launched with an added directive for a second platoon to be deployed to Vietnam within 12 months.

LWL's first problem in the second phase of the program was to locate a contractor to do the training. The University of Maryland, which had supported the Laboratory in its initial effort, was no longer interested, and no other contractors with adequate facilities, competence, and experience, were apparent. Finally, a small company, Behavior Systems, Incorporated (BSI) was located in Raleigh, N.C., and was awarded a sole-source contract. In essence, LWL was building this company, whose only previous work was a small Air Force contract. On the basis of the LWL contract, they were able to get a loan to build kennels, procure land, and hire the necessary staff of handlers.

It is interesting to note that with the societal trends of that era (early 1968) and because of BSI's location in a college town, the staff,

perhaps necessarily, consisted largely of "hippie" types. These people proved quite capable and dedicated, but nonetheless kept LWL personnel holding their breath for fear of possible student demonstrations or adverse reactions as these employees came in contact with military personnel. Things became particularly interesting when BSI personnel were sent to Fort Gordon and later to Okinawa to work with military handlers. However, all fears were groundless as no serious incidents occurred.

The 60th Scout Dog Platoon, which had been organized during the feasibility phase, was assigned to Fort Gordon where BSI supervised and conducted training, and formation of a second platoon was begun. It is worthwhile noting that the planning and development for the evaluation of this program was conducted in the Pentagon with formal direction of the ACTIV evaluation of the platoon in Vietnam originating there. This was one of the few LWL operations directed in this manner.

The 60th Scout Dog Platoon, consisting of 14 mine- and 14 tunnel-detection dogs plus handlers, was actually deployed to Vietnam in April 1969 for ACTIV evaluation. It was originally assigned to the 25th Division, and later to the Americal Division[4]. The platoon was assigned to a Division. Individual teams could be drawn by battalions or companies as needed for combat operations. A doctrinal problem was resolved by experiment, and it was shown that the dogs and handlers should not be decentralized below platoon level except for daily missions. A few dog teams were also borrowed by the Marines for operational evaluation. Although several problems were encountered, the ACTIV evaluation again showed the dogs highly capable in their mission.

One problem was that the dogs had been trained to work trails but the operational requirement was for their utilization primarily in cross-country patrols. Retraining, however, proved to be no difficulty. Feeding was another problem; it became necessary to ship special dog food to Vietnam on a priority basis, a logistics problem LWL was able to surmount. Radio transmitters were not used operationally, so the dogs could not be used out of sight of the handlers. Acclimation also proved to be a problem and because of this, the second platoon was staged through Okinawa for 6 weeks of training. Handlers were also trained at this time. A major problem proved to be in getting experienced dog handlers to accept the new procedures devised by BSI and proven effective. This reorientation

of Army thinking was perhaps the most difficult single problem and probably the least successful aspect of the program. Perhaps here, the outward physical appearance of BSI personnel was one roadblock.

With the successful operational employment of the 60th Platoon, an ENSURE requirement was written for a third platoon, which was subsequently trained at Fort Benning. The Marines requested a platoon, so that ultimately four platoons were organized and deployed to Vietnam. The Marine Platoon was deployed in May 1970 and evaluated over a 9-month period[5]. The dog platoons remained an important factor in combat operations in Vietnam for the duration of the war. The dog training program was phased into Army operations and it is interesting to note that without this work, BSI, which was practically created by LWL in its search for a contractor, was soon out of business.

LWL has continued to pursue the development of dogs in detection roles with much of the continuing research contracted to Southwest Research Institute. This has evolved into a program to develop a multipurpose dog trained to perform seven tasks related to small infantry unit combat missions. These tasks include: mine detection, tripwire detection, tunnel and punji pit detection, cache detection, ambush detection, tracking, and command control attack. A number of other tasks have been oriented toward non-combat missions, such as drug and explosive detection, principally for the Military Police. References 6 through 16 are additional reports on LWL detector dog studies.

Personnel Detector Task

In 1963 the number of ambushes against U.S. and South Vietnamese troops was increasing at a rate that called for effective countermeasures; as a consequence, LWL undertook a personnel detection project which examined all feasible methods, i.e., electronic, physical, optical, chemical, etc., having potential usefulness. The outcome of the study indicated chemical effluent detection as the most promising approach, based on the successful detection of submarines by the U.S. Navy utilizing this technique. At about this time Mr. Frank van Leuk of the General Electric Company visited LWL and discussions with him revealed that the submarine detection device, known as the ASK-5, operated on the basis of detecting condensation nuclei released from operating submarines and that detection ranges of many miles in the open sea were achievable. Subsequently, Mr. H. T. Reilley and Mr. I. M. Sherman of LWL visited the

General Electric Advanced Technology Laboratory in Schenectady to learn more about this condensation nuclei detector. At about this time LWL funded a condensation nuclei program with General Electric for another Government agency interested in detecting a different type of target.

LWL purchased General Electric's commercial condensation nuclei counters, made some preliminary tests in Schenectady, then took them to Panama to check their behavior in the jungle environment. By using an electrical corona discharge at the intake of the condensation nuclei device it was possible to detect ammonia (one of the key effluents from human beings) in the Panama jungle, and it was also possible to detect sulfur dioxide (the stack effluent from ships passing through the Canal) using an ultraviolet converter to first transform the sulfur dioxide into condensation nuclei. The ability to detect the effluent from small arms fire was readily demonstrated during these tests. The detection of humans in the jungle was achieved because of the extremely low natural level of condensation nuclei; in average city streets the high level would completely mask the effluent from humans. One of the numerous problems which appeared during these early tests evolved from the fact that the corona technique necessary for detecting the ammonia from humans also converted any sulfur dioxide present into condensation nuclei thus providing the user with a troublesome ambiguity.

Following the Panama tests, the project engineers returned to the Laboratory for more controlled studies, including approaches for the detection solely of ammonia, together with calculations to determine, if possible, what true levels of concentration of condensation nuclei were being detected at various sensitivity settings. Early in 1964 the project people went to Panama again for more testing, still using the large commercial condensation nuclei detector. Because of the size and weight of these laboratory-type devices, it was necessary to transport them through the jungle on special large "wheelbarrows".

Later in 1964, LWL signed a contract with the General Electric Company for the development of three man-pack condensation nuclei devices, the first "people sniffers". In 1965 these were tested at Fort Bragg, Fort Sill, and Panama by a Special Forces team assigned to LWL for the purpose of establishing the effectiveness with which the devices could detect personnel in ambush. This team learned, within a short period of time, to interpret the readings so as to

eliminate spurious signals. The tests confirmed that the detector was wind dependent and that the detection of personnel through measurement of carbon dioxide, another candidate effluent (using a technique which first converted the carbon dioxide to iron carbonyl), was unreliable.

By 1965, the ambush problem had become so important that the need for a solution had been called out by the Advanced Research Projects Agency, by the Agnew Committee, and other groups. At the LWL Symposium on Ambush Detection, a paper on the condensation nuclei detector was presented to the other Services. The acceptance of the condensation nuclei detector at high Army level was immediate and LWL was instructed by the Army Scientific Advisory Panel to proceed at maximum speed both with further testing and with procurement of improved units.

In the meantime, LWL had made the first airborne test by suspending one of the experimental man-pack units 150 feet below a helicopter in an attempt to detect vehicle effluent on the ground. This trial was successful, and LWL was directed to pursue the airborne mode, to use direction-finding equipment, and to try it on various aircraft (U-6, NU8F). Brigadier General Alvin E. Cowan, Director of Developments, OCRD, himself ran tests using Doppler navigation, first at Schenectady and later at Panama. These tests, in which the device was carried in a magnetometer pack suspended from the aircraft, were performed in July and early August 1965. In late August, the condensation nuclei detector, under the name Project Lodestar, was taken to Vietnam and demonstrated to Generals John Throckmorton, Deputy CG, MACV, and W. E. DePuy, ACS J-3, MACV, the latter personally testing the man-pack version.

At about this time, the condensation nuclei detector was also tested as a detector of explosives. It detected well those explosives, such as dynamite, which produced a copious nitrogenous effluent, less well those with C3, and it failed to detect pentolite and TNT.

During February and March 1966 the first of the production detectors went to Vietnam with a Special Forces team. By August 1966, 173 units were delivered to Vietnam, on schedule, within the terms of the production contract which ran from November 1965 to August 1966.

The results from the field use of this highly sophisticated unit, the development of which had required the cooperative contributions of top-notch chemists, physicists, mechanical engineers, and electronic engineers, were

mixed. In the man-pack role, it was agreed that the detector worked, but it was not a well-liked piece of equipment: the lead man who carried it was a prime target. Other objections were that it was wind dependent, and that its use required that other important loads, such as food and ammunition, be left behind. On the other hand, in the airborne role helicopter pilots made systematic, rasterlike flights over suspected areas with good results. Their success in target acquisition in the aerial mode was sufficiently outstanding that the units continued to be so used until 1970. Perhaps as valuable as the target-acquisition role was the negative information provided by "the sniffer" when it could report that there was no human activity within many square miles of jungle. This enabled search forces to concentrate their reconnaissance on a manageable few "hot spots".

A number of specialized units, such as the twenty airborne prototypes fitted with three detectors each, were made for use in Vietnam. Six special two-detector units were made for Air Force use in Thailand, and their success resulted in the production of 65 airborne units for the Army and 10 for the U.S. Marines.

One confirmable credit occurred at Pleiku under General W. R. Peers when these detectors gave the first indication that the North Vietnamese 272nd and 277th Regiments were operating north of Pleiku. These detectors monitored the infiltration of the North Vietnamese and were responsible for the successful ambush of the two regiments.

A special unit built for use in the OV-1 (advanced airborne system) worked well, but the system was unsatisfactory because of unreliability of the range-prediction segment of the system. Had a better and different navigation device been available at the time, it is probable that the system would have been successful.

A few of the units survive. Some are in use in Vietnam by the Vietnamese and some are in storage at Tooele Air Force Base. References 17 through 27 are LWL reports documenting this program.

Measurement of Success

It is very difficult to place any quantitative or objective measure of success on an R&D laboratory such as LWL. However, since LWL's mission was to develop items to meet operational needs, one possible measurement is to count how many items were actually accepted for use operationally. In 12 years, LWL conducted approximately 635 development tasks (not including GNI). From these, some 140 items were standardized in some form. These items are reflected in the lists accompanying Exhibit 24, Appendix A, Foreword to the 1974 LWL Annual Report. Since some LWL tasks are still open as this report is written, the total items accepted will probably be greater in any final accounting. In any case, better than 22 percent of LWL tasks resulted in an end item that was acceptable for operational use, or, put in other terms, on a limited budget and with a small staff, LWL was able to develop about 12 items a year to meet operational needs of combat units in the field. Whether either statistic marks LWL as a successful operation is probably for the reader to decide. The Foreword to the FY 74 Annual Progress Report contains additional discussion of this aspect of the Laboratory. One other positive assessment of LWL's success is found in the letter from Harold Brown of DDR&E (Exhibit 19, Appendix A) in which he states that LWL has "proven, dollar for dollar, to be the most productive of the many existing efforts to meet the equipment needs of the nation's counterinsurgency efforts".

ADVANTAGES AND LIMITATIONS OF LWL

As is the case with all organizations, LWL had its advantages and limitations. Being a small, specially chartered laboratory attached to the Army at a very high level, it had the high visibility which spotlighted both its virtues and its faults. The elan of LWL depended to no small degree on the firm belief of its people in the modus operandi which, to the typical organization man, contained too much of the maverick and the undefined. The maximization of any characteristic to a great degree almost always incurs a diminution in some other characteristic, as is recognized by the old adage, "You cannot have your cake and eat it too." Accordingly, a list of the strengths of LWL is also by implication a list of its weaknesses, and they are listed together below so that the managerial trade-offs are more evident.

- Its military component and close liaison with the field made it quick to recognize the needs of the troops. The constant immersion in current operational problems cultivated a here-and-now attitude at LWL and fostered a growing criticism of the deficiencies associated with long-term, deliberate efforts insensitive to immediate needs.
- Its projects were started with the best available state of the art. This practice engendered criticism from those whose better art was promised in the near future, from those who felt that more loyalty should be shown to Army R&D, and from those who saw an unexpacted competition emerging from a different direction than the one commonly touted.
- Its specific approach to the development of an item of materiel was selected early, and was assigned to and carried through to the end, by a single project engineer. This encouraged pride, responsibility, and enthusiasm in the engineers but found disfavor with those who measured worth by unblotched escutcheons rather than return for the dollar.

- Its items of materiel were tested for usefulness under actual field conditions. The confrontation of user and developer through the medium of a prototype greatly improved the wisdom of both.

- Its small size and straightforward organization permitted it to shorten the complete R&D cycle to an average of 18 months. Obviously large and complex developments could not be done by such a small and diverse organization, and there was a strong dependence on contractors and other laboratories. Its limited funding also made it very dependent on others for supporting services and precluded any production capability, which proved to be severe limitations. The rewards of personal accomplishments in R&D were foregone in many cases for the purpose of getting the job done as a manager.

- Its attachment to the Army Office, Chief of Research and Development, permitted direct access to all levels of the Department of Defense, allowing prompt action on R&D matters as well as personnel and funding needs. On the other hand, the high visibility resulted in a number of demoralizing criticisms from those who saw functional duplication, close identification of LWL with the waning war in Vietnam, and meddling in day-to-day business of R&D by the Army staff. Perhaps more damaging was the feeling by some that the very existence of LWL was an affront to the larger R&D organizations and a testimony that Army management was ineffective in eliciting active response through the layered bureaucracy of R&D establishments.

- Its mission permitted it to put aside any planned program and turn immediately to urgent demands of the moment. The advantages of this practice were never really accepted by those who insisted on knowing in advance how money was to be spent. It was a strength to be flexible and a weakness to admit the possibility of unplanned emergencies.

- It was permitted to proceed with programs funded up to $200,000 without prior R&D approval. This flexibility was under attack on several occasions, but persisted through the life of the laboratory by a continued review of recent past history and the statement that drastic revision of task funding was almost always a headquarters demand in response to an urgent problem rather than a private opinion of the Commanding Officer, USALWL.

- Its Military Operations Division, together with other provisions, permitted it to maintain close liaison with and surveillance of actual field operations.

- It was a multidisciplinary organization with many personnel who had more than one area of expertise. Depth was traded for breadth, and long-term dedication to a particular expertise for flexibility with the short-term problem.

- It offered a technical alternative to the monopolistic threat associated with lead laboratories. Competition, viewed as duplication, was wasteful, but it did much to improve the response of Army R&D to operational problems by providing a small capability to look for holes in the armor and cracks in the wall.

- Its quick-reaction capability and close relationship with field operations allowed both project engineers and assigned military personnel, up to the Commanding Officer, to see immediate results of the Laboratory's efforts, thus encouraging renewed enthusiasm for future tasks.

In summary, the 12 years of LWL might be viewed as a worthwhile experiment which reversed, for a very small part of the Army, the trend toward centralization and specialization. LWL was run very much as a small business among corporate giants. By operating under a different set of rules, it was able to complement the Army laboratory system in a useful way.

As an organizational anomaly with high visibility, it was under frequent attack and constant examination. Differences in modus operandi were often viewed as liabilities rather than as assets, as a deviation rather than as a complement. The experiment was useful and interesting, and the philosophical basis for LWL will continue to be a matter of dissension among people who are faced with the problem of R&D, whether or not another such experiment is accepted in the immediate future.

LESSONS LEARNED

One whole group of valuable experiences can be put in the form of advice to managers of new R&D laboratories:

(1) Start from scratch. Do not inherit either the brains or the barnacles of some already existing operation because of convenience.

(2) Report to a level as high up in the chain of command as possible. This reduces reaction time and minimizes external paper work, which in turn minimizes internal paper work.

(3) Insist on and accept complete accountability, then delegate in turn as much as possible of this accountability to the operating level.

(4) Interview personally every candidate for each position. Try to measure not merely the technical or scientific competence, but the whole man; it is the latter which must coact with fellow workers and the public.

(5) Recruit R&D talent from as many diverse sources, e.g., military, industrial, commercial, and academic, as is necessary to cover the required technical areas, scientific disciplines, or techniques.

(6) Hire the top level of management first, if the necessary outstanding individuals are available initially. Otherwise, hire the next lower echelon of chiefs and select from them, after a period of observation, the candidates for the top level. For chiefs, select individuals who have been deputies to top R&D chiefs.

(7) For a strong organizational backbone, select seasoned R&D personnel who have working knowledge of at least one, preferably two, technical areas or scientific disciplines adjacent to their own area of competence, which must be outstanding.

(8) Assign responsibility of the entire R&D cycle of a given project, from concept, reduction to practice, engineering model, test, etc., to final production package, to one man, who will work with or without a team.

(9) Involve the customer by obtaining a formal requirement. Write the requirement for the customer in draft if necessary, show drawings, experimental models, or demonstrate prototypes, if possible. Provide an impedance

match between the R&D organization, which knows product design well but the customer and its market place poorly, and the customer, who knows the field of application well but the technology poorly. (LWL used combat arms officers in the Military Operations Division having some technical knowledge or R&D experience as the coupling between scientists and engineers in the laboratory and military users in the field.)

(10) Involve the production organization and its personnel at an early stage. (Experience showed that the earlier and more completely the AMC Parent Agency became involved in a development, the more likely its successful continuation. If an engineer from the other agency could be made to feel a quasi-parenthood by sharing in the development problems and feeling responsible for their solution, he was less likely to experience the "not-invented-here" syndrome.)

(11) Be aware of the laboratory's threshold size, below which R&D cannot function well or efficiently; this size depends upon the breadth and scope of the projects. (For LWL this lower limit was approximately 80.)

(12) Be aware of the maximum size above which span of control, direct contact between individuals at the project level, and free flow of ideas among project personnel begin to suffer. With increasing size, reaction time increases disproportionately together with the number of regulations to be observed and the paper work involved for records and reports. (The maximum size for LWL was probably 250 people.)

(13) Recognize and establish the autonomy or self-determination level. This should be the highest R&D supervisory echelon at which all principal details for every category of project are known. (For LWL this was the Branch Chief level.)

(14) Promote psychological reinforcement to maintain initiative and drive. (At LWL this was achieved in two ways. First, the dedication to short-term projects where the individual can see his efforts materialize in concrete fashion in a short period, such as 18 months. Second, the freedom of the individual to act, coupled with accountability, as with the Generation of New Ideas program.) Countenance permissiveness, but control it with unobtrusive scrutiny. These elements tend to instill a wholesome air of constructive competitiveness among the personnel.

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GLOSSARY OF ACRONYMS

ACTIV	Army Concept Team in Vietnam
APG	Aberdeen Proving Ground
AMC	Army Materiel Command
APP	Army Procurement Procedures
ARPA	Advanced Research Projects Agency
ASA	Army Security Agency
ASPR	Armed Services Procurement Regulation
BSI	Behavior Systems, Incorporated
CDC	Combat Development Command
CLOARAD	Comprehensive Law and Order Assistance Research and Development
DCPG	Defense Communications Planning Group (Now DSPG - Defense Special Projects Group)
DDR&E	Director of Defense Research and Engineering
ENSURE	Expedited Nonstandard Urgent Requirements for Equipment
FOPEN	Foliage Penetration Radar
GNI	Generation of New Ideas
HELNAVS	Helicopter Navigation System
MAC V	Military Assistance Command, Vietnam
MOD	Military Operations Department
LWL	Limited (Land) Warfare Laboratory
MASSTER	Mobile Army Sensor Systems Test Evaluation and Review Activity (Army Project)
OCRD	Office of Chief of Research and Development
OPMG	Office Provost Marshall General
PROVOST	Priority Research Objectives for Vietnam Operational Support Tasks
TECOM	Test and Evaluation Command
TRADOC	Army Training and Doctrine Command
USAEUR	U. S. Army Europe
USARV	U. S. Army Vietnam
USCONARC	U. S. Continental Army Command

APPENDIX A

DOCUMENTATION

This Appendix contains copies of various correspondence, orders, directives, and miscellaneous papers that serve to document the history and procedures of the U. S. Army Land Warfare Laboratory (LWL). The intent is to provide as complete documentation as possible to supplement discussions in the report concerning how LWL was organized and how it operated. The following documents are included:

Exhibit 1. Organization of the United States Army Limited War Laboratory

Exhibit 2. U. S. Army Land Warfare Laboratory (Unit Discontinued)

Exhibit 3. U. S. Army Limited War Laboratory Site Selection

Exhibit 4. U. S. Army Limited War Laboratory (Announcement)

Exhibit 5. U. S. Army Limited War Laboratory - Activation Plan

Exhibit 6. U. S. Army Land Warfare Laboratory - Missions and Functions, LWL Directive No. 2

Exhibit 7. Redesignation of the United States Army Limited War Laboratory, General Orders Number 5

Exhibit 8. U. S. Army Land Warfare Laboratory - Mission Clarification

Exhibit 9. U. S. Army Land Warfare Laboratory (Reassigned), General Orders Number 35

Exhibit 10. Proposed Evaluation Plans, LWL Directive No. 31

Exhibit 11. Testing Procedures, LWL Directive No. 10

Exhibit 12. Memorandum of Agreement on U. S. Army Land Warfare Laboratory Liaison Officer to MASSTER*

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* Exhibits 12, 13, and 24 have been retyped from the original in order to provide a suitable copy for reproduction.

HEADQUARTERS, DEPARTMENT OF THE ARMY
Office of The Adjutant General
Washington 25, D. C.

AGAC-O (M) 322 (25 May 62) CRD 15 June 1962

SUBJECT: Organization of the United States Army Limited War Laboratory (9976)

TO: Chief of Research and Development

1. Effective 15 June 1962, the United States Army Limited War Laboratory (9976) is organized under TD 91-9976, as a Class II activity, under the command of the Chief of Research and Development, with station at Aberdeen Proving Ground, Maryland.

2. Administrative and logistical support will be provided this laboratory on a reimbursable basis by the Commanding General Aberdeen Proving Ground.

3. The mission of this activity is to provide a centralized quick reaction research and development activity responsible for meeting Army requirements relating to limited war, particularly to war of low intensity in under-developed or remote areas of the world.

By Order of the Secretary of the Army:

Adjutant General

Copies furnished:
Commanding General
Aberdeen Proving Ground, Maryland

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DEPARTMENT OF THE ARMY
HEADQUARTERS UNITED STATES ARMY MATERIEL COMMAND
5001 Eisenhower Ave, Alexandria, VA 22333

GENERAL ORDERS
NUMBER 72

23 April 1974

TC 001. Following action directed.

US ARMY LAND WARFARE LABORATORY, UIC W05AAA, TDA M1W05AAA, CCNUM M10174, TPSN 56151, FPLAN CRX, Asg M1, Station: ABERDEEN PROVING GROUND, MARYLAND

Action: Unit DISCONTINUED
Assigned to: NA
Mission: NA
Effective date: 30 June 1974
Military Structure Strength: NA
Military Authorized Strength: NA
Civilian Structure Strength: NA
Civilian Authorized Strength: NA
Accounting classification: NA
Files/records: IAW AR 340-18 series
Morning Reports: IAW AR 680-1
Authority: DA Message 212144Z Feb 74, subject: Approval of Realignment Actions
Special Instructions: The function of maintaining direct contact with Army materiel users in the field to ascertain specific requirements for improvements and/or new materiel and to evaluate those requirements and establish appropriate projects is reassigned from the Land Warfare Laboratory to the Army Materiel Systems Analysis Agency.

FOR THE COMMANDER:

JOSEPH W. PEZDIRTZ
Major General, USA
Chief of Staff

OFFICIAL:

JOHN LYCAS
Colonel, GS
Chief, HQ Admin Mgt Ofc

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GENERAL ORDERS
NUMBER 72

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1--HQDA (DAFD-MFA)
5--HQDA (DAFD-MFD)
1--HQDA (DAFD-DOA)
1--Cdr, US Army Major Item Data Agency, Chambersburg, PA 17201
2--Cdr, MILPAC I, ATTN: PCPSF-I-BE, Ft. Meade, MD 20755
1--AMC Mil Pers Mgt Det, Edgewood Arsenal, MD 21010
2--Cdr, TRADOC, ATTN: ATLG-MAT-PM, Ft. Monroe, VA 23351
2--ACCNC-CSA

HEADQUARTERS
DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF RESEARCH AND DEVELOPMENT
WASHINGTON 25, D.C.

CRD

11 May 1962

MEMORANDUM FOR: CHIEF, RESEARCH AND DEVELOPMENT

SUBJECT: U.S. Army Limited War Laboratory Site Selection

1. Reference: OCRD Memorandum, subject: "U.S. Army Limited War Laboratory Planning Group", dated 16 April 1962.

2. In accordance with reference, the Planning Group surveyed numerous military and non-military locations to determine a site for the Limited War Laboratory. Those installations considered are listed in Inclosure I.

3. None of the agencies considered completely met the requirements for an early establishment (15 June 62) of the laboratory. Of those considered, the two listed below provided the majority of elements necessary and far surpassed that which could be provided by any other considered installation.

a. Aberdeen Proving Ground. The advantages of APG are a wide range of on post scientific disciplines, many competent research personnel, adequate explosive test facilities and test ranges, adequate shop and laboratory facilities and proximity to the Army Chemical Center. Disadvantages of APG, none of which are serious, include difficulty in obtaining rental housing within reasonable commuting distances, inconvenient public transportation from commercial airports and large cities, and availability of only a marginally adequate building. The building, however, can be converted in approximately 10 months and at a cost of $200,000 into a completely adequate building. Temporary quarters can be provided in the interim.

b. Frankford Arsenal. The advantages of Frankford Arsenal include the immediate availability of building requiring less modification than the building at APG, in-house competence in engineering and development, shop and manufacturing facilities with considerable unused capacity, availability of rental housing, and close proximity to universities and public transportation. The disadvantages of Frankford Arsenal include absence of on site explosive and other test areas (Fort Dix test facility is 30 miles distant), location in a crowded industrial area, lack of breadth in in-house research programs, and the production oriented mission of the arsenal.

c. Both Aberdeen Proving Ground and Frankford Arsenal made a strong plea to have the Limited War Laboratory.

d. A complete survey of each installation visited is available and can be presented in briefing form if additional information on any or all of the considered sites is desired.

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CRD 11 May 1962

SUBJECT: U.S. Army Limited War Laboratory Site Selection

4. It is recommended that Aberdeen Proving Ground be approved as the site of the Limited War Laboratory. In addition to the advantages listed above, the following additional considerations were pertinent to the selection:

a. Compatibility of the mission and technical requirements of the Limited War Laboratory with those of other activities at Aberdeen Proving Ground (BRL and HEL).

b. Past history of Aberdeen Proving Ground indicates an ability to attract and hold highly competent professional personnel.

Joseph T. Brown

JOSEPH T. BROWN
Lt Colonel, GS
Chairman, U.S. Army L.W.L. Planning Group

1 Incl:
Listing of Sites

Approved
AGT

1. INSTALLATIONS VISITED:

   a. Diamond Ordnance Fuse Laboratory, Washington, D.C.

   b. U.S. Army Engineer Research and Development Laboratory, Fort Belvoir, Virginia

   c. U.S. Army Signal Research and Development Laboratory, Fort Monmouth, N. J.

   d. U.S. Army Quartermaster Research and Engineering Command, Nattick, Mass.

   e. Picatinny Arsenal, Picatinny, New Jersey

   f. Aberdeen Proving Ground, Aberdeen, Maryland

   g. Edgewood Arsenal, Army Chemical Center, Edgewood, Maryland

   h. Frankford Arsenal, Philadelphia, Pa.

   i. Army Research Office, Durham, N.C.

   j. Fort Bragg, North Carolina

2. INSTALLATIONS CONSIDERED BUT NOT VISITED:

   a. Fort Totten, N. Y.

   b. Fort Knox, Ky.

   c. Detroit Arsenal, Michigan

   d. Springfield Armory, Mass.

   e. Ft. Dietrich, Maryland

   f. Ft. Rucker, Ala.

   g. Ft. Eustis, Virginia

   h. Watertown Arsenal, N. Y.

   i. Watervliet Arsenal, N. Y.

   j. CRREL, N. H.

HEADQUARTERS
DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF RESEARCH AND DEVELOPMENT
WASHINGTON 25, D.C.

16 MAY 1962

CRD

MEMORANDUM FOR: CHIEF OF STAFF

SUBJECT: U.S. ARMY LIMITED WAR LABORATORY

1. I would like to advise you that I have approved Aberdeen Proving Ground as the site of the U.S. Army Limited War Laboratory. This site provides easy access to the wide range of scientific and technical disciplines in which the laboratory will be working and has been concurred in by the Special Forces Center, and the Army Materiel Command as well as the General Staff.

2. I have also selected Colonel Sterling C. Holmes as the Commanding Officer of the laboratory. Currently assigned to Redstone Arsenal, he will report for duty on my Limited War Laboratory Planning Group by 28 May 1962. Selection of the civilian Technical Director will be accomplished by 1 June 1962.

3. As specified in the original Summary Sheet proposing the laboratory, it is intended to activate the laboratory, although not fully staffed, on or about 15 June 1962.

4. Attached is a press release I intend passing to CINFO.

CS 635 (16 May 62)

Arthur G. Trudeau

ARTHUR G. TRUDEAU
Lieutenant General, GS
Chief of Research and Development

1 Incl:
Press Release

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IMMEDIATE RELEASE

The U. S. Army has announced its designation of Aberdeen Proving Ground as the site for its new Limited War Laboratory. The Laboratory will serve as the Army's quick response organization for the development of specialized weaponry and other materiel for use in such field s guerrilla, counterguerrilla, and counterinsurgency operations.

At the same time, Colonel Sterling C. Holmes, Ordnance, was selected as the Commanding Officer of the Laboratory. Colonel Holmes, a former combat infantry officer, is currently assigned to Redstone Arsenal but will report to his new assignment immediately in order to assist in the planning and subsequent activation.

Members of the Laboratory, approximately 70 in number, will represent a wide variety of scientific fields, and will work closely with key agencies of the Army's Combat Development System. Included will be chemists, physicists, electronic scientists, natural scientists, analysts and engineers who will conduct research and development to provide highly effective weapons and techniques to meet requirements of forces in the field. Recruitment of key civilian personnel has been initiated.

Various facilities are planned for the Laboratory for the conduct of its unique work, including specialized chemical, electronics and biological facilities, experimental fabrication shops, and a library devoted to Limited War publications. In addition, the Laboratory will utilize the wide variety of resources available at Aberdeen Proving Ground and other Army agencies.

ACTIVATION PLAN FOR THE U. S. ARMY LIMITED WAR LABORATORY

The US Army Limited War Laboratory, activated on 15 June 1962 as a Class II activity under the command of the Chief of Research and Development, is designed to provide a centralized research and development activity with a quick reaction capability for meeting Army operational requirements related to limited war - particularly to war of low intensity in underdeveloped or remote areas of the world. The foregoing description makes it abundantly clear that one of the most pressing tasks of the laboratory is to reduce lead time in getting hardware in the hands of the using troops for tests.

In order to accomplish its mission rapidly and effectively, maximum use will be made of other government laboratories, universities, and industry. Therefore, during the early period of reaching an operational status, much effort will be devoted to determining capabilities and resources within and outside the government to meet requirements. At the same time requirements from the Special Doctrine and Equipment Office, Special Warfare Center, and overseas areas will be obtained. This will entail extremely close liaison and coordination with the foregoing agencies to assure rapid response to the most urgent needs of troops in the field.

A temporary facility for the USA Limited War Laboratory is now established in Building 4721, at Aberdeen Proving Ground, Maryland. If you desire additional information, please direct correspondence to the foregoing address or, telephone Aberdeen Proving Ground, Area Code 301, 272-4000, extensions 31191, 40294, 43197 or 40198.

S. C. HOLMES
Colonel, OrdC
Commanding

1 Incl
Activation Plan

DISTRIBUTION:
OCS, Sp Asst for Special Warfare
CRD
DCSLOG
DCSOPS
DCSPER
ACSI
USA Special Warfare Center
US Army Materiel Command
USA Combat Development Command
USCONARC

LIMITED WAR LABORATORY ACTIVATION PLAN

TABLE OF CONTENTS

1. ACTIVATION

The United States Army Limited War Laboratory was established as a Class II activity, under the command of the Chief of Research and Development, with station at Aberdeen Proving Ground, Maryland, effective 15 June 1962. Authority for establishment is contained in ltr AGAO-O(M) 322 (25 May 62) CRD, dtd 15 Jun 62, Office of the Adjutant General. The letter further provided that administrative and logistical support would be provided the laboratory on a reimbursable basis by the CG, APG.

2. MISSION

The mission of the U. S. Army Limited War Laboratory is to provide a centralized research and development activity with a quick reaction capability for meeting Army operational requirements relating to limited war, particularly to war of low intensity in under-developed or remote areas of the world. This includes specifically the provision of a quick reaction facility for accomplishing short-range developments of specialized limited warfare items. It conducts research and development leading to the provision of new items and techniques in the use of materials to improve the effectiveness of military personnel committed to limited warfare actions.

U. S. ARMY LIMITED WAR LABORATORY

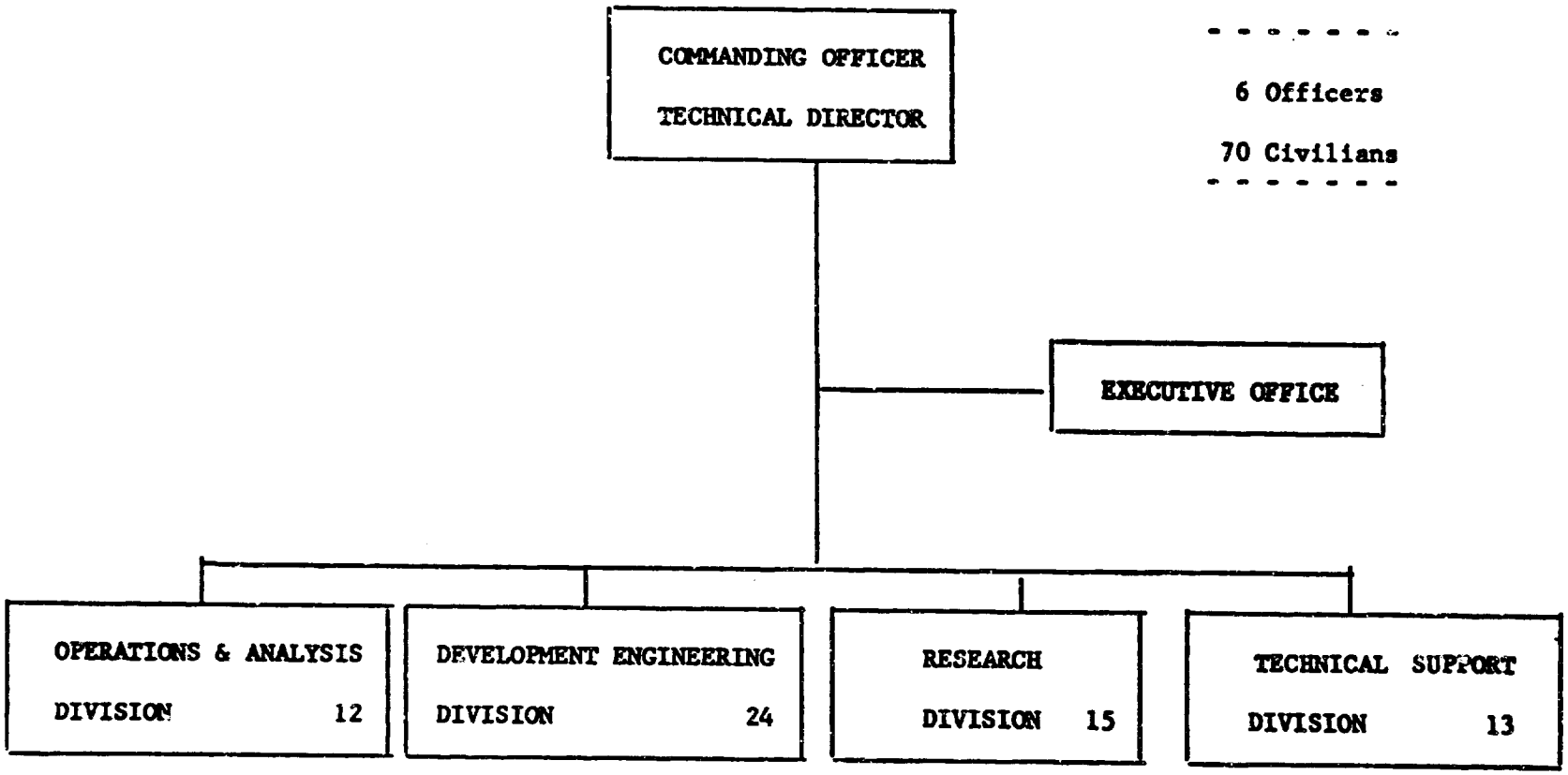


Figure 1.

3. FUNCTIONS

a. Major Functions

As a centralized R&D agency, the USA LWL will accomplish the following major functions to fulfill the assigned mission:

(1) Provide a quick-reaction capability responsive to assigned requirements related to its mission. The capabilities of existing Army research and development installations, as well as those of industry, shall be utilized to supplement the in-house facilities of the USA LWL in the development and fabrication of special items.

(2) Act as the materiel and equipment counterpart of the Special Doctrine and Equipment Office; provide close liaison with field installations and with users, and assess field requirements in terms of present and foreseeable technology.

(3) Generate new ideas for materiel, with special emphasis on interdisciplinary approaches, examine their technical feasibility, and refer them to appropriate agencies for the generation of formal requirements and subsequent development.

(4) Serve as the centralized point for advancing the technology of limited war through cognizance of existing R&D programs, dissemination of information relating to such programs, coordination of related efforts at U. S. Army research and development installations, providing a point of contact with industry and the other services and, within its mission, evaluate new ideas, projects and proposals.

(5) Act as a stimulus for increasing R&D activities relating to the development of materiel for limited warfare purposes.

(6) Conceive of and provide expedient solutions to materiel problems by using resources available in the natural environment by modification of previously issued materiel.

(7) Perform applied research and exploratory development studies in line with its mission.

(8) Maintain a continuing and current knowledge of the various scientific disciplines and engineering skills relating to its mission.

b. Executive Office

(1) Provides executive support to the Commanding Officer and the Technical Director.

(2) Directs and controls internal administration of the Limited War Laboratory.

(3) Provides mail, records, security, facilities and other administrative services and support to all elements of the Limited War Laboratory.

(4) Provides unit personnel services for the Limited War Laboratory.

(5) Plans for and coordinates LWL administrative and logistical requirements with APG (excluding technical matters) and acts as the commander's representative with the Proving Ground.

(6) Defends, executes, and monitors programs and budget for the operation of the Limited War Laboratory.

(7) Analyses and evaluates organizational and management aspects of the Limited War Laboratory; advises the Commanding Officer of management trends, and recommends appropriate revisions or reorganizations.

c. Operations and Analysis Division

(1) Conducts the necessary programs to ascertain military needs in connection with the Laboratory's mission.

(2) Evaluates the requirements and items developed to meet tactical requirements in terms of overall satisfaction for the purpose intended.

(3) Establishes close liaison and contact with agencies and personnel in the field to provide bases for formulation of studies and development.

(4) Assesses validity of proposals and recommendations in terms of knowledge of field requirements.

(5) Makes quantitative studies required to establish effectiveness and utility under conditions encountered in field of items proposed or deve oped.

(6) Prepares reports describing overall needs within the mission of the Limited War Laboratory.

(7) Serves as major contact point with forces in field, Government agencies, special forces personnel and U. S and foreign personnel knowledgeable in the requirements pertinent to LWL mission.

d. Development Engineering Division

(1) Provides the necessary engineering and development competency for achieving quick reaction fabrication of assigned limited war items relating to, but not limited to, communications, electronics, surveillance, munitions, weapons, mobility and environmental survival by:

(a) Quick reaction fabrication of limited war items through the use of in-house facilities.

(b) Modification and/or redesign, and fabrication of materiel based upon new ideas originating within the Laboratory or referred to the Laboratory from outside sourses.

(c) Utilization of the research and development capabilities of existing research and development installations to include inservice and industrial facilities.

(d) Utilization of indigenous resources available in the natural environment.

(2) Generates new ideas and technical concepts pertaining to materiel for limited war, evaluates the technical feasibility of new ideas and concepts which are submitted.

(3) Provides information and advice as requested regarding plans, programs or proposals relating to the development, modification or fabrication of limited war materiel.

(4) Maintains a continuing and current knowledge of the engineering and development aspects of limited war materiel.

(5) Provides the engineering and development competence required for technical evaluation of limited war materiel and proposals.

(6) Provides a point of contact with industry and other services for matters within its cognizance.

(7) Prepares reports of accomplishments upon completion of tasks.

e. Research Division

(1) Performs studies, exploratory research and applied research leading to the generation of new ideas for limited war materiel, with special emphasis on interdisciplinary approaches.

(2) Generates new ideas and technical concepts pertaining to materiel for limited war; evaluates the technical feasibility of new ideas for concepts which are submitted.

(3) Utilizes the research capabilities of existing Army research and development installations as well as those of industrial and academic organizations, as required, in the performance of research pertaining to warfare of low intensity in underdeveloped or remote areas.

(4) Maintains a current and continuing knowledge or the scientific disciplines as they relate to limited war.

(5) Maintains cognizance of research efforts related to limited war at existing research and development installations.

(6) Prepares reports of accomplishment, upon completion of tasks.

f. Technical Support Division

(1) Provides a quick response capability for fabrication and repair of unique, unusual, and specialized devices.

(2) Controls and supplies all property and materials assigned to or used by the Limited War Laboratory.

(3) Maintains a scientific library service to include appropriate publications on Special Warfare, Guerrilla Warfare, and Counter-guerrilla Operations.

(4) Provides technical personnel for test planning and coordination; coordinates and procures range requirements.

(5) Arranges for and provides other technical and scientific services.

4. PERSONNEL

a. The tentative time-phase schedule on personnel is as follows:

POSITION	TO BE FILLED BY
Commanding Officer	19 June 1962
Technical Director	20 July 1962
Deputy Technical Director	March 1963
Chief, Executive Office	10 July 1962
Chief, Operations & Analysis Division	25 July 1962
Chief, Development Engineering Division	20 August 1962
Chief, Research Division	31 August 1962
Chief, Technical Support Division	20 August 1962
Executive Office Personnel	13 August 1962
Librarian	31 August 1962
Branch Chiefs	31 October 1962

b. The anticipated growth rate of the Laboratory in FY63 is as follows:

DATE	PERSONNEL (Cumulative Total)
15 August 1962	15
31 October 1962	30
31 December 1962	46
28 February 1963	56
30 April 1963	66
30 June 1963	76

5. FACILITIES

a. Temporary Facility

The USA LWL is presently occupying building 4721 on a temporary basis. The building consists of a two-wing, two-floor, H-type frame structure, and it is being renovated to meet the office space requirements of the Laboratory for FY63. The renovation is proceeding on the following schedule:

(1) First Wing.

The interior renovation of the first wing, both floors, was completed on 15 June 1962. It is presently furnished to support thirty people, and it includes two conference rooms.

(2) Second Wing.

The interior renovation of the second wing is scheduled to be completed by 30 September 1962. It will provide space for thirty people plus a technical library.

(3) Exterior Renovation.

The contract for the exterior renovation of building 4721 is being negotiated, and the renovation is scheduled to be completed by 30 September 1962.

b. Experimental Shop (Permanent)

One-third of building 643, a permanent type, brick exterior building, has been selected as the site for the Experimental Shop. The building is assigned to the Development and Proof Services (D&PS), which will evacuate one-third of the building by 31 July 1962. This portion of the building will be converted into the permanent experimental shop for the Laboratory, and it will include a storage area. It is located within hundred yards of the permanent Laboratory facility, building 642. The equipment to be located in building 643 is listed in paragraph 5. The time-phase schedule on building 643 is as follows:

(1) Building to be evacuated by D&PS by 31 July 1962.

(2) Plans for interior renovation completed by 15 August 1962.

(3) Building ready for occupancy by 31 October 1962.

c. Permanent Facility

Building 642 has been selected as the permanent office and laboratory facility for USA LWL. It is located near Mulberry Point, Aberdeen Proving Ground, Maryland. It is a permanent type, brick exterior building, previously assigned to D&PS. The building has been evacuated and the renovation schedule is as follows:

(1) Architect plans to be completed by 31 August 1962.

(2) Contract negotiation for renovation to be completed by 15 October 1962.

(3) Building ready for occupancy by 31 May 1962.

(4) Relocation of personnel and equipment from building 4721 to building 642 by 30 June 1963.

U. S. ARMY LIMITED WAR LABORATORY

TIME-PHASE SCHEDULE ON FACILITIES

FACILITY	1962							1963					
	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN
Bldg 4721, First Wing	RR												
Bldg 4721, Second Wing	PPPP	PPPC	CCCC	RRRR									
Bldg 4721, Exterior	PPPP	PPPC	CCCC	RRRR									
Bldg 643, Experimental Shop	PPPP	PPPP	PPCC	CCRR	RRRR								
Bldg 642, Main Facility	PPPP	PPPP	PPPP	CCCC	CCRR	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	RRRR	

NOTE:

P : Planning Phase
C : Contract Negotiation
R : Renovation in Progress

Figure 2.

6. OPERATIONAL STATUS

The current staff of the laboratory is screening applicants and selecting key personnel for the laboratory.

It is planned to achieve a partial operational status with personnel and equipment by the end of November 1962 and a nearly complete operational capability by the end of May 1963.

DEPARTMENT OF THE ARMY
U. S. Army Land Warfare Laboratory
Aberdeen Proving Ground, Maryland 21005

LWL Directive
No. 2

16 April 1971

U. S. ARMY LAND WARFARE LABORATORY

MISSION AND FUNCTIONS

I. PURPOSE:

The purpose of this directive is to prescribe and define the mission, functions, and responsibilities of the organizational components of the U. S. Army Land Warfare Laboratory.

II. CONTENTS:

RICHARD L. CLARKSON
Colonel, GS
Commanding

This directive supersedes LWL Directive No. 2, dated 10 April 1968.

1. Mission:

The mission of the U. S. Army Land Warfare Laboratory is to provide a centralized quick reaction research and development facility for accomplishing development of specialized military items and for the generation of new ideas for such material.

2. Functions of the Commanding Officer and Technical Director:

a. Commanding Officer:

(1) Responsible for the efficient and effective utilization of all resources of the Laboratory in accomplishing its assigned mission.

(2) Responsible to the Chief of Research and Development for assuring that the Laboratory achieves and maintains a quick response capability.

b. Technical Director:

(1) Is responsible for the technical planning, coordination and execution of the program of the Laboratory.

(2) Provides direct technical and scientific guidance to all divisions of the Laboratory in all areas of scientific research and engineering in order to assure: continuity of the overall program; maximum utilization of research accomplishments in supporting the development program and test; and maximum pursuance, locally or under contract, of research areas of vital importance to the overall program.

(3) Is personally responsible for monitoring high priority tasks assuring maximum application of effective and efficient engineering and scientific principles, together with the maximum utilization of resources of the Laboratory.

3. Functions of Program/Operations Division:

a. Major Functions:

(1) Provides executive support for the Commanding Officer and the Technical Director.

(2) Provides direction and control of the internal administration of the Land Warfare Laboratory.

(3) Directs and controls the internal logistics support for the Laboratory.

(4) Develops procedures and provides guidance and analyses in the preparation of research and development contract requests.

(5) Provides focal point for contact with supporting agencies on non-technical subjects (Host-Tenant Agreement).

(6) Provides internal program and budget services for the Laboratory.

(7) Provides general management services with specific emphasis on development of procedures and techniques for minimizing the administrative workload of the scientific staff.

b. Detailed Functions of Major Elements of Program/Operations Division:

(1) Office of Chief:

(a) Provides the principal advice and assistance to the Commanding Officer and Technical Director with respect to the responsibilities specified above; directs and supervises the chiefs of subordinate elements in the execution of their functions.

(b) Provides membership or attendance as required on boards, committees and groups in non-scientific subject areas.

(2) Administrative Services Branch:

(a) Coordinates and provides administrative services as required with relation to travel, military personnel service record data and unit personnel services.

(b) Provides mail receipt and distribution services and classified document control services.

(c) Administers and supervises security functions for the Laboratory to include visitor control, building security, initiation of clearance requests, receipt and maintenance of personnel clearances from other Government agencies and Government contractors, security inspections and security investigations.

(d) Maintains liaison with Office, Chief of Administration, Chief of Research and Development, DA, on matters relating to civilian and military personnel, security, travel and other administrative policies and services.

(e) Responsible for preparation, submission and maintenance of the USALWL Table of Distribution and Allowances (TDA).

(f) Maintains organization personnel data and is responsible for publishing Laboratory organization chart.

(g) Provides guidance to management on personnel actions and is responsible for personnel actions control and follow-up.

(h) Provides guidance, establishes control and authenticates CONUS travel requests for Laboratory personnel.

(i) Provides guidance to travelers scheduled for OCONUS TDY.

(j) Responsible for Laboratory forms control and reproduction services.

(k) Responsible for records management program and records inspection.

(l) Provides manpower analysis and preparation of manpower reports.

(m) Responsible for Laboratory management improvement and incentive awards program.

(n) Responsible for Laboratory equal employment opportunity program. Provides counselor service on equal employment opportunity related programs.

(o) Maintains liaison with Training and Development Branch, Installation Civilian Personnel Division and the Laboratory Training Committee to insure effective administrative support of approved training programs.

(p) Responsible for publication of Letter Orders, Special Orders and General Orders.

(q) Responsible for guidance and preparation of internal directives on personnel, security, and other administrative procedures.

(r) Maintains Reading Room containing a variety of books, reference texts and periodicals pertinent to the Laboratory mission.

(s) Maintains complete set of Army Regulations, DA Circulars, OCRD Regulations and APG Regulations.

(3) Logistics Services Branch:

(a) Prepares and processes supply and purchase requests for the supplies, equipment, blank forms, publications, services and rentals required by the Laboratory.

(b) Maintains follow-up systems on supply and purchase requests.

(c) Provides procurement analysis and research and development contracting services and is the focal point for Laboratory scientific personnel and installation contracting personnel in the preparation, award and execution of R&D contracts.

(d) Maintains property books and hand receipts for accounting for Laboratory property.

(e) Receives, delivers, stores and warehouses property of the Laborator,

(f) Disposes of excess property of the Laboratory.

(g) Provides industrial property administration services on Laboratory research and development contracts.

(h) Maintains records, files and directives for the functions of the branch. Prepares internal and external logistical reports.

(i) Provides equipment maintenance services.

(j) Arranges for transportation, coordination of courier service and shipment of property.

(k) Controls on-Post messenger provided by Host Installation for quick response processing of supply and procurement requests in support of high priority tasks.

(l) Provides data management services to the Laboratory.

(m) Provides materials handling service for on-Post support of task officers.

(4) Program/Budget Branch:

(a) Provides planning, programming, budgeting, accounting and financial management service to all elements of the Laboratory.

(b) Develops plans, policies and techniques for development and execution of the Laboratory's RDTE Operating Program. Prepares R&D Planning Summary and Program Data schedules covering the Laboratory's objectives, progress and accomplishments, and current and long-range plans.

(c) Responsible for program development from inception of tasks as branch input, through internal review and final selection action. The final step in this process is preparation of a program package for OCRD approval.

(d) Develops and schedules Review Board procedure, records Review Board actions, and provides a tentative program to Military Operations Division for coordination with the Combat Developments Command.

(e) Correlates the program with Internal Operating Budget. Develops internal fiscal procedures to include maintenance of a work order control system authorizing the release and cancellation of work.

(f) Accomplishes reprogramming actions and program revisions; and prepares internal and external program reports. Prepares analyses of the Laboratory work effort by functional areas, scientific fields, in-house vs out-of-house, types of performer, category of work and various combinations to meet a variety of requirements.

(g) Develops budgetary plans and objectives in accordance with DA and OCRD guidance, and the LWL program. Prepares, presents and defends LWL Internal Operating Budget. Represents the Laboratory on the APG Program/Budget Advisory Committee.

(h) Maintains fiscal records and documents the allocation of financial resources. Prepares internal and external budget reports, financial statements and cost analyses.

(i) Maintains an information base reflecting fundamental programming, funding and operating data necessary for effective decision by Laboratory management and essential for timely, accurate reporting of Laboratory operations to the Chief of Research and Development.

(j) Assists Laboratory personnel in the fiscal aspects of contractual actions and in preparation of cost estimates and assures the accuracy, availability and propriety of funds.

(k) Controls work assignments under support contracts.

(l) Maintains separate records, accountability and controls for the Laboratory's Reimbursable Order Program, including funds from ARPA, Air Force, Navy, other Government agencies and the Combat Developments Command TECMAT program.

(m) Effects transfer of funds, monitors host-tenant performance and costs, and within the program/budget area maintains direct liaison with on-Post activities, other Government agencies and with Program and Budget Division and Research Programs Office, Chief of Research and Development, Department of the Army.

4. Functions of Military Operations Division:

a. Major Functions:

(1) Maintain current knowledge of doctrine, tactics and materiel being employed by our forces. Provide a focal point for coordination with forces in the field and Government agencies knowledgeable in requirements and maintains necessary SDR's, QMR's and other types of requests for equipment within the development scope of this Laboratory.

(2) Monitor Laboratory development tasks and provide operational input to insure that development programs meet the operational requirements as expressed by the user.

(3) Provide military support to include aviation, for the conduct of tests, demonstrations and briefings.

b. Detailed Functions:

(1) Provides the principal advice and assistance to the Commanding Officer and the Technical Director with respect to the responsibilities specified above.

(2) Maintains close liaison with the Office, Chief of Research and Development and Combat Developments Command agencies to effect exchange of and dissemination of information relating to materiel research and development.

(3) Establishes detailed knowledge of requirements of users world-wide.

(4) Determines and assesses experiences of organizations in operations and establishes tactical criteria for materiel required.

(5) Determines and makes basic recommendations regarding tactical suitability of proposed devices and techniques to accomplish purpose intended.

(6) Reviews and makes recommendations on items developed and programs prosecuted in terms of satisfactoriness for meeting required objectives.

(7) Coordinates, prepares and conducts briefings and demonstrations as required for visiting dignitaries.

(8) Provides the overall supervision of Laboratory aviation test and support activities.

(9) Receives requests for and programs aircraft and flight personnel to accomplish these requests.

(10) Develops flying hour program, coordinates budgeting, prepares flight orders and maintains flight order file.

(11) Provides for general administration of Laboratory aviation support.

(12) Provides membership as required on boards, committees and groups.

(13) Provides Laboratory point of contact for USALWL Liaison Officers OCONUS.

5. Functions of Development Engineering Division:

a. Major Functions:

(1) To provide the necessary engineering and development competency for achieving quick reaction fabrication of specialized items relating to but not limited to communications, electronics, surveillance, munitions, weapons, mobility and environmental survival by:

(a) Quick reaction fabrication of specialized items through the use of in-house facilities.

(b) Modification and/or redesign and fabrication of materiel based upon new ideas originating within the Laboratory or referred to the Laboratory from outside sources.

(c) Utilization of the research and development capabilities of existing research and development installations to include in-service and industrial facilities.

(d) Utilization of indigenous resources available in the natural environment.

(2) Generates new ideas and technical concepts pertaining to materiel for special uses; evaluates the technical feasibility of new ideas and concepts which are submitted to it.

(3) Provides information und advice as requested regarding plans, programs or proposals relating to the development, modification or fabrication of specialized materiel.

(4) Maintains a continuing and current knowledge of the engineering and development aspects of specialized materiel.

(5) Provides the engineering and development competence required for the technical evaluation of materiel and proposals as required.

(6) Provides a point of contact with industry and other services for matters within its cognizance.

(7) Performs studies, exploratory research and applied research leading to the generation of new ideas for materiel, with special emphasis on interdisciplinary approaches.

b. Detailed Functions of Major Elements of Development Engineering Division:

(1) Office of the Chief:

(a) Provides the principal advice and assistance to the Commanding Officer and Technical Director with respect to the responsibilities specified above; directs and supervises the chiefs of subordinate elements in the execution of their functions.

(b) Provides membership or attendance as required on boards, committees, groups and scientific symposia.

(2) Communications and Electronics Branch:

(a) Provides the necessary engineering and development competency for achieving quick reaction fabrication of specialized materiel in the fields of electronics, communications and surveillance by electronic means.

(b) Generates new ideas and technical concepts pertaining to materiel in the fields of communications, electronics, and surveillance, evaluates the technical feasibility of new ideas and concepts submitted to it.

(c) Achieves the quick reaction fabrication of specialized items of materiel in the field of electronics, communications and surveillance through optimum use of in-house facilities, those of existing Army research and development installations and those of industry.

(d) Provides the engineering and development necessary for the modification and/or design and fabrication of small quantities of specialized items in the fields of electronics, communications and surveillance based upon requirements of field installations and users, and upon new ideas originating within the Laboratory or referred to the Laboratory from outside sources.

(e) Programs the utilization of specialized fabrication facilities of existing research and development installations or of industrial facilities, as required, in the development and fabrication of specialized items in the areas of communications, electronics and surveillance.

(f) Provides information and advice as requested, regarding plans, programs or proposals relating to the development, fabrication or modification of specialized materiel items in the areas of communications, electronics and surveillance.

(g) Maintains a current and continuing knowledge of the engineering and development of specialized materiel in the areas of communications, electronics, and surveillance.

(h) Provides the engineering and development information required for the evaluation and testing of specialized materiel in the areas of communications, electronics and surveillance.

(i) Performs studies, applied research, and advanced developments in the fields of electronics, communications and surveillance related to special materiel needs.

(3) Munitions Branch:

(a) Provides the necessary engineering and development competency for achieving quick reaction fabrication of specialized materiel in the field of munitions.

(b) Generates new ideas and technical concepts pertaining to specialized materiel in the fields of munitions, explosives, and weaponry; evaluates the technical feasibility of new ideas and concepts which are submitted to it.

(c) Achieves quick reaction fabrication of specialized items in the field of munitions through optimum use of in-house facilities, those of existing Army research and development installations and those of industry.

(d) Provides the engineering and development necessary for the modification and/or design and fabrication of small quantities of specialized items in the field of munitions, based on requirements of field installation and users, and upon new ideas originating within the Laboratory or referred to the Laboratory from outside sources.

(e) Programs and monitors the utilization of specialized fabrication facilities of existing research and development installations or of industrial facilities, as required, in the development and fabrication of specialized items in the areas of munitions and explosives.

(f) Provides information and advice, as requested, regarding plans, programs or proposals relating to the development, fabrication or modification of specialized materiel in the areas of munitions and explosives.

(g) Maintains a current and continuing knowledge of the engineering and development of materiel in the areas of munitions and explosives.

(h) Provides the engineering and development information required for the evaluation and testing of materiel in the areas of munitions and explosives.

(i) Performs studies, applied research and advanced development in the field of munitions.

(4) Mobility Branch:

(a) Provides the necessary engineering and development competency for achieving quick reaction fabrication of specialized materiel in the field of mobility.

(b) Generates new ideas and technical concepts pertaining to materiel needs in the area of mobility; evaluates the technical feasibility of new items and concepts which are submitted to it.

(c) Achieves the quick reaction fabrication of specialized items in the field of mobility through optimum use of in-house facilities, those of existing Army research and development installations and those of industry.

(d) Provides the engineering and development necessary for the modification and/or design and fabrication of small quantities of specialized items in the field of mobility based upon requirements of field installations and users and upon new ideas originating within the Laboratory or referred to the Laboratory from outside sources.

(e) Programs and monitors the utilization of specialized fabrication facilities of existing research and development installations or of industrial facilities as required in the development and fabrication of specialized items in the areas of mobility.

(f) Provides information and advice, as requested, regarding plans, programs or proposals relating to the development, fabrication or modification of specialized materiel in the area of mobility.

(g) Maintains a current and continuing knowledge of the engineering and development of materiel in the area of mobility.

(h) Provides the engineering and development information required for the evaluation and testing of specialized materiel in the area of mobility.

(i) Performs studies, applied research and advanced developments in the field of mobility.

(5) Environment and Survival Branch:

(a) Provides a quick reaction facility for meeting the requirements for items and equipment for the individual soldier to overcome hostile elements in the natural environments of remote regions.

(b) Generates ideas and concepts for the development of items of equipment for the individual soldier and small military units by making use of the indigenous resources available in the environments of remote areas of the world; evaluates the technical feasibility of new ideas and concepts which are submitted to it.

(c) Provides for the modification of existing equipment in the military and civilian economy to solve special problems met by the individual soldier and small military units as they arise in the field in remote areas of the world.

(d) Provides engineering and development information as required for the evaluation and testing of equipment for the individual soldier and small military units for sustenance, well being, survival and shelter under field conditions.

(e) Provides information and advice, as requested, regarding plans, programs and proposals relating to the development, modification or fabrication of survival and shelter equipment for use by individual and small units.

(f) Provides for adaption of material and items available to or developed by indigenous people to use by the U. S. Army for purposes of shelter, sustenance and concealment.

(g) Provides for the special equipment for individual soldiers of allied indigenous forces in remote areas.

(h) Performs studies, applied research and exploratory development in the field of environment and survival.

6. Functions of Advanced Development Division:

a. Major Functions:

(1) Performs studies, exploratory research and applied research leading to the generation of new ideas for specialized materiel, with special emphasis on interdisciplinary approaches.

(2) Conducts a development program on physical, chemical and biological systems and items of materiel.

(3) Generates new ideas and technical concepts pertaining to materiel for special uses; evaluates the technical feasibility of new ideas and concepts which are submitted to it.

(4) Utilizes the research and development capabilities of existing Army research and development installations as well as those of industrial and academic organizations, as required, in the performance of R&D pertaining to warfare of low intensity in underdeveloped or remote areas.

(5) Provides the necessary research and development competency for achieving quick response fabrication of specialized materiel relating to its fields of interest.

(6) Maintains a current and continuing knowledge of the scientific disciplines as they relate to military materiel needs.

(7) Maintains cognizance of research and development efforts at other military research and development installations.

b. Detailed Functions of Major Elements of Advanced Development Division:

(1) Office of the Chief:

(a) Provides the principal advice and assistance to the Commanding Officer and the Technical Director with respect to the responsibilities specified above; supervises and directs the chiefs of subordinate elements in the execution of their functions.

(b) Provides membership or attendance as required on boards, committees, groups, or scientific symposia.

(2) Applied Chemistry Branch:

(a) Performs studies, applied research and development of specialized materiel in the general field of applied chemistry including flame and incendiaries, smoke, contaminants, signalling, detection devices, pyrotechnics and related areas.

(b) Performs studies and applied research in the field of chemistry as directed.

(c) Generates new ideas and technical concepts pertaining to chemical material and evaluates the technical feasibility of new ideas and technical concepts submitted to it.

(d) Utilizes the research and development capabilities of existing Army research and development installations as well as those of industrial and academic organizations, as required, in the performance of research and development relating to the field of applied chemistry.

(e) Provides the necessary research and development competency for achieving quick response fabrication of specialized materiel relating to its field of interest.

(f) Maintains a current and continuing knowledge of the pertinent chemical sciences as they relate to military needs.

(g) Maintains a cognizance of research and development efforts in its field of interest at existing military research and development installations.

(3) Applied Physics Branch:

(a) Performs studies, applied research and development of specialized materiel in the general field of applied physics including detection, surveillance, reconnaissance, target acquisition and related fields.

(b) Generates new ideas and technical concepts pertaining to materiel needs in the general field of applied physics; evaluates the technical feasibility of new ideas and concepts which are submitted to it.

(c) Utilizes the research and development capabilities of existing Army research and development installations as well as those of industrial and academic organizations, as required, in the performance of research and development relating to the field of applied physics.

(d) Maintains a current and continuing knowledge of the pertinent physical sciences as relate to military needs.

(e) Maintains a cognizance of research and development efforts at other military research and development installations in the general field of applied physics including detection, surveillance, reconnaissance, target acquisition and related fields.

(f) Provides the necessary research and development competency for achieving quick response fabrication of specialized materiel relating to its field of interest.

(4) Biological Sciences Branch:

(a) Perform studies, exploratory development and applied research to assure that the development of items of equipment for troops in the field in remote areas is feasible and consistent with the biological environment.

(b) Generates new ideas and technical concepts pertaining to materiel in the areas of biology; evaluates the technical feasibility of new ideas and concepts submitted to it.

(c) Conducts a development program on military systems and items of materiel related to the biological sciences; conducts physiological assessment studies for determining the potential of biologically active materials.

(d) Provides the necessary research and development competency for achieving quick response fabrication of specialized materiel relating to its field of interest.

(e) Collects and disseminates biological data of significance on remote areas of the world.

(f) Identifies the biological resources of the areas of conflict in remote regions that can provide materiel for sustenance, well-being, shelter, weapons, concealment, barriers and communication.

(g) Maintains a current and continuing knowledge of scientific disciplines as they impact upon biological factors affecting materiel and use of equipment in remote areas.

(h) Maintains cognizance of research and development efforts in biological sciences and related fields concerned with warfare in remote areas.

7. Functions of Technical Support Division:

a. Major Functions:

(1) Provides to all segments of the Laboratory a capability for the design and drafting functions required in the development of LWL materiel items.

(2) Provides a quick response capability for the manufacture, assembly, modification and/or repair of unique, unusual and specialized devices and limited quantities of those items urgently requested by the field user.

(3) Provides test liaison coordination and safety (to include explosive and general industrial safety) monitoring for all elements of the Laboratory. Serves as Laboratory Safety Representative.

(4) Administers and executes all requirements for the Laboratory pertaining to facility needs to include buildings, grounds, utilities, etc.

(5) Provides to all segments of the Laboratory a loan service for cameras, recording equipment, etc., as required.

(6) Generates new ideas and performs development work as necessary on tasks assigned to the division for accomplishment.

(7) Serves as the focal point for all Laboratory requirements pertaining to safety, Safety Committee, Safety Statements, etc.

b. Detailed Functions of Major Elements of Technical Support Division:

(1) Office of the Chief:

(a) Chief, Technical Support Division:

1. Provides the principal advice and assistance to the Commanding Officer and the Technical Director with respect to the responsibilities specified above; supervises the chiefs of subordinate elements in the execution of their functions.

2. Provides membership as required on boards, committees and groups.

3. Serves as Chairman, LWL Safety Statement Committee, in accordance with LWL Directive No. 19 dated 17 February 1969.

(b) Test Liaison Officer:

1. Provides test liaison functions involving planning, coordination, etc., on all LWL items.

2. Establish liaison and effect coordination with test agencies concerning LWL items undergoing various phases of testing (EDT, ET/ST, MPT, etc.).

3. Prepares test programs for engineering phases of LWL development tasks when requested.

4. Arranges for and evaluates suitability of test facilities.

5. Prepares and maintains schedule of major and minor test programs of the Laboratory.

6. Coordinates with USATECOM and other test facilities to assure conduct of test by most expeditious, efficient and economic means.

7. Participates in the assessment and validation of proposed techniques to obtain required data.

8. Schedules tests upon request utilizing facilities and resources available in the Laboratory.

9. Provides safety SOP's on LWL items, explosive and general industrial safety monitoring for all elements of the Laboratory.

(2) Design Branch:

(a) Provides to all segments of the Laboratory a capability for the design and drafting functions required for the development of LWL materiel items based on concepts submitted by scientific and engineering personnel.

(b) Maintains a continuing reference file of available off-shelf material, equipment and devices applicable to the design and fabrication of specialized materiel.

(c) Establishes and maintains for the Laboratory a systematic and consistent method of preparing, recording and storing engineering design drawings.

(d) Provides a service to all elements of the Laboratory for the preparation of technical material (charts, graphs, concept drawings, sketches, etc.).

(e) Determines incidental raw materials, hardware and other miscellaneous materials necessary to accomplish assigned tasks.

(f) Provides facility support services (buildings, grounds, utilities, etc.) for the Laboratory when necessary.

(3) Experimental Shop Branch:

(a) Accomplishes the fabrication of all equipment devices required to support the research and development effort of the Laboratory.

(b) Provides a capability to the Laboratory for the limited production of specific items in response to field users' requests.

(c) Provides a capability for the fabrication of scaled conceptual working models for engineering study and specialized displays.

(d) Develops specialized manufacturing and assembly techniques required for the fabrication of experimental and prototype devices.

(e) Maintains a continuing in-stock supply of various raw materials, hardware, fasteners, etc., for use on assigned tasks as required.

(f) Supports LWL development tasks by the conduct of tests to investigate the design integrity and compatibility of item components manufactured and assembled.

(g) Receives, classifies, stores, issues and inventories various explosives, pyrotechnics, munitions, etc., used for testing purposes and under the control of the Laboratory.

8. Functions of Special Activities Division:

a. Major Functions:

(1) Maintains a current knowledge of scientific disciplines and the ideas and concepts of other government agencies, the academic community, and industry with regard to specialized materiel needs of the Army.

(2) Performs studies and exploratory and applied research leading to the generation of new ideas for specialized Army materiel needs.

(3) Evaluates the technical feasibility of new ideas and technical concepts, whether generated in-house or submitted from outside sources.

(4) Utilizes, as required in the performance of its functions, the research and development capabilities of existing Army R&D installations, as well as those of industrial and academic organizations.

(5) Provides the Laboratory with the capability for conducting broad scientific studies and investigations to define military technical needs and to provide a firm basis for Laboratory R&D tasks.

(6) Maintains technical liaison and coordination with other DA agencies in order to permit the rapid evaluation of LWL-developed items by users and to provide for the type-classification or production of these items, when appropriate, in an orderly and timely manner.

(7) Provides the Laboratory with the following: technical editing, visual aids, displays for a variety of occasions, briefing materials, public information service, and electronic computer support.

(8) Provides such other professional services and guidance to all Laboratory levels as falls within the division mission.

b. Detailed Functions of Major Elements of Special Activities Division:

(1) Office of the Chief:

(a) Provides the principal advice and assistance to the Commanding Officer and the Technical Director with respect to the responsibilities specified above. Supervises the chief of subordinate elements in the execution of their functions.

(b) Provides membership as required on boards, committees, groups or scientific symposia.

(2) Research Analysis Branch:

(a) Conducts studies of broad problem areas necessary to define military technical needs in connection with the Laboratory's mission and thereby provide a firm foundation for Laboratory research and development tasks.

(b) Generates new ideas for specialized Army materiel needs through the performance of exploratory and applied research investigations.

(c) Using analytical techniques, quantitatively evaluates the ability of materiel items, both proposed and in various stages of development, to fulfill their intended role under field conditions.

(d) Develops criteria, measures of effectiveness, mathematical models, and other techniques required for support of the Branch's overall program.

(e) Maintains an operational statistics capability to provide a base of realistic operational data for the R&D activities of the Laboratory.

(f) Conducts test programs, in coordination with the appropriate R&D branch(es), to generate data necessary for the full execution of programs assigned to the branch.

(g) Maintains and utilizes a data bank of descriptive information on past and current LWL tasks.

(h) Administers the Laboratory's unsolicited proposal program (including the maintenance of appropriate records and cross-references), and participates in the evaluation of the technical feasibility of new ideas and concepts submitted under this program.

(i) Is responsible for the overall administration, programming and operation of the Laboratory's electronic computer facility.

(j) Provides technical consultation services to other Laboratory personnel in such areas as operations research, systems analysis, mathematics and statistics, and test design, as appropriate.

(k) Provides Laboratory representation at operations research and other appropriate scientific and technical meetings.

(l) Prepares and issues reports to document the findings of branch studies.

(3) Materiel Readiness Branch:

(a) Maintains technical liaison and coordination with other DA agencies and serves as a source of guidance within the Laboratory on all matters pertinent to placing LWL items into the hands of the user in a timely and orderly manner. These functions are performed for the Laboratory as follows:

1. With parent agencies to insure rapid assumption of responsibility by the designated parent agency for type-classification and/or production of LWL items.

2. With user agencies and commands, such as USARV, MACV, 8th U. S. Army, USAEUR, OTPMG, to insure adequate logistic support and proper introduction of LWL developed items into operational areas.

3. With CONARC, DOMS, OTPMG and other DOD and non-DOD agencies, such as LEAA, to insure evaluation of LWL developed items for law enforcement and civil disturbance control.

4. With STANSM and Project MASSTER to insure adequate participation of LWL items in the U. S. Army STANO and Project MASSTER Test Program.

5. With CDC and CDC agencies on TECMAT programs to insure that "Off-the-Shelf" items are adequately evaluated and reported on by LWL and, if necessary, to assist CDC in further actions they deem appropriate.

6. With the Navy and AMC agencies on VLAP and VLAPA programs to insure no duplication of effort on LWL programs.

(b) Formulates and recommends the Laboratory response to all ENSURE requests.

(c) Initiates and coordinates Laboratory actions with EODC on appropriate items.

(d) Prepares and coordinates Laboratory responses to patent infringement claims.

(e) Conducts, as requested, special studies on the readiness of LWL-developed items.

(f) Prepares recurring and special reports on the Laboratory development effort, evaluations in RVN, and type-classification actions.

(g) Provides guidance to and assists development branches during preparation for and conduct of all IPR's and S-IPR's.

(h) Provides technical editing services to the Laboratory.

(i) Provides guidance for (1) data requirements, (2) technical reports, (3) manuals, and (4) memoranda, for inclusion in contract requests.

(j) Prepares, publishes and releases material for public information media.

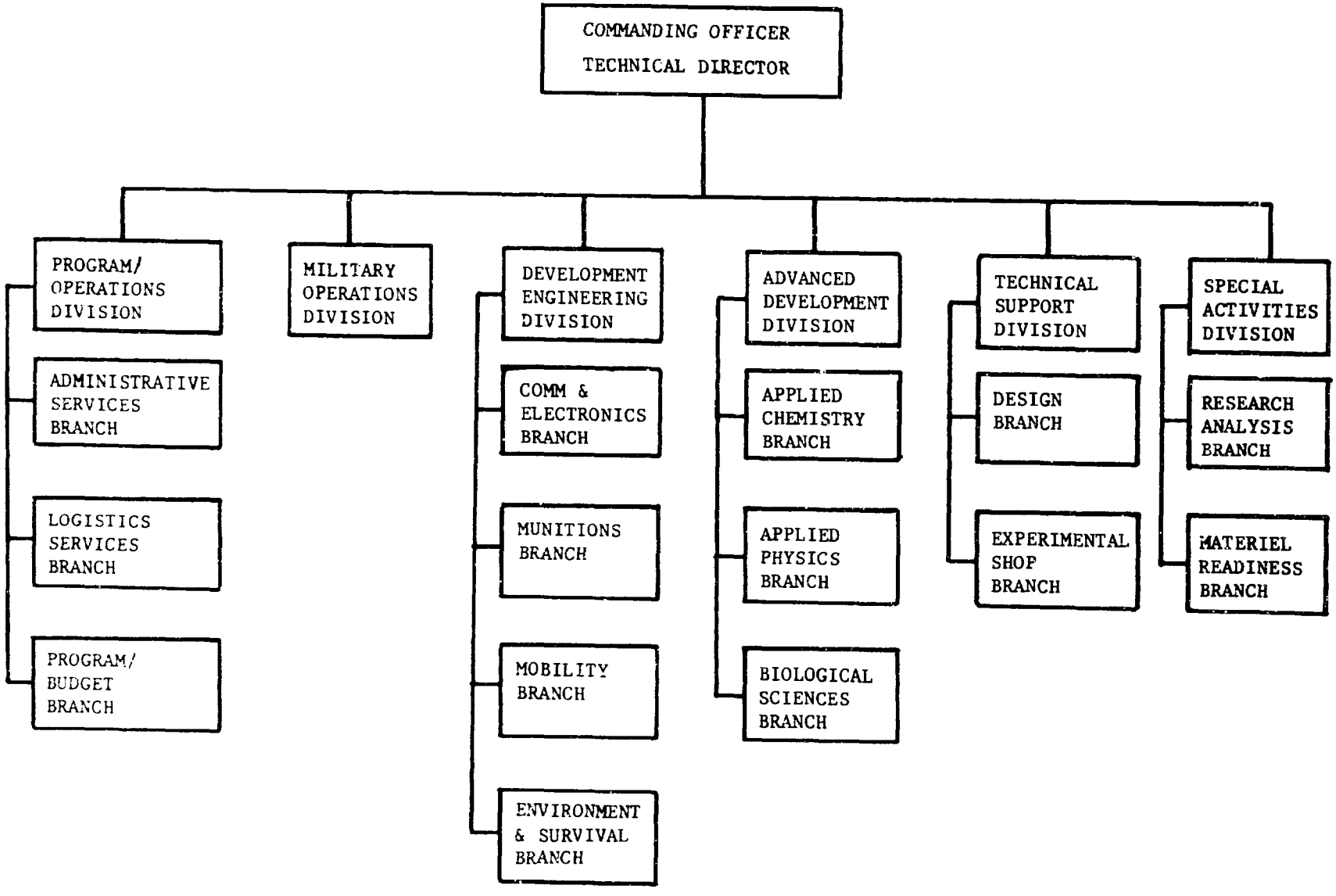
(k) Provides services incident to the preparation of displays, visual aids and briefing material required by the Laboratory.

9. Laboratory Organization:

The current Laboratory organization, at branch level, is attached as Annex A.

U. S. ARMY LIMITED WAR LABORATORY

ORGANIZATION CHART



DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF RESEARCH AND DEVELOPMENT
Washington, D.C. 20310

GENERAL ORDERS
NUMBER 5

21 January 1970

REDESIGNATION OF THE
UNITED STATES ARMY LIMITED WAR LABORATORY

TC 001. Following action directed.

United states Army Limited War Laboratory (SF-W05AAA-00), Aberdeen Proving Ground, Maryland 21005

Action: Redesignated United States Army Land Warfare Laboratory (SF-W05AAA-00)
Assigned to: Office of the Chief of Research and Development (CS-WIBXAA-00), Washington, D.C. 20310
Mission: To provide a centralized quick reaction research and development facility for accomplishing development of specialized military items and for the generation of new ideas for such material.
Effective date: 16 January 1970
Authorized strength: No change
Structure strength: No change
Required strength: No change
Accounting classification: NA
Files/records: Files will be continued and cutoff in the same manner as though no change occurred, and disposition effected in accordance with approved disposition standards.
Morning reports: In accordance with paragraph 4-3, AR 680-1.
Authority: NA
Special instructions: None

FOR THE CHIEF OF RESEARCH AND DEVELOPMENT:

JOE GARNER
CW4, USA
Administrative Officer

DISTRIBUTION:
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DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF RESEARCH AND DEVELOPMENT
WASHINGTON, D.C. 20310

DARD-DDS

23 NOV 1971

SUBJECT: U.S. Army Land Warfare Laboratory

Commanding Officer
U. S. Army Land Warfare Laboratory
Aberdeen Proving Ground, Maryland 21005

1. References:

a. Letter, AGAO-O(M)322(25 May 62) CRD, 15 Jun 62, subj: Organization of the United States Army Limited War Laboratory (9976).

b. Letter, AGAM-P(M)322(21 Aug 62) CRD, 28 Aug 62, subj: U. S. Army Limited War Laboratory.

c. Letter, OCRD, 20 Aug 65, subj: Reprogramming and Obligation Authority.

d. Letter, AGAO-D(M)(25 Mar 70) CRDSTN, 25 Mar 70, subj: Redesignation and Mission of the US Army Limited War Laboratory.

2. References a and b announced the organization of the Limited War Laboratory (LWL), assigned its mission and established operating procedures. Reference c provided additional guidance concerning funding authority. Reference d changed the name of the organization to the Land Warfare Laboratory and directed a change in mission. The provisions of these directives remain in effect subject to the amendments of references a and b by references c and d and with certain terminology changes announced in other publications; however, changing events require some clarification of LWL's mission and functions. This letter provides the necessary guidance for future operations of LWL.

3. The Laboratory was initially established to meet Army requirements anywhere in the world. With the deployment of US Forces in Vietnam shortly after the establishment of LWL, the Laboratory's efforts became concentrated on the solution of urgent problems facing our forces in combat in Southeast Asia. Although much of the materiel developed had application to other geographical areas and other forms of warfare, little attention was devoted

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DARD-DDS 23 NOV 1971
SUBJECT: U. S. Army Land Warfare Laboratory

to the troops outside of Vietnam. As the active involvement of US Forces in Vietnam draws to a conclusion, LWL must redirect its capabilities toward solution of problems being encountered by the Army in other areas, in other situations and in other types of warfare. The Army will continue to face problems susceptible to rapid solution, at least in part, in all of the many environments in which it operates, in training, in combat development, in extreme climates, in garrison. LWL should direct emphasis toward discovering and solving those problems which frequently arise unexpectedly and are of concern to the commander involved. The goal in these instances may be limited procurement to provide relief, pending a forthcoming better solution in the more distant future. Particular attention should be paid to the welfare of the individual soldier, to small user groups requiring specialized materiel applicable to their environment, and to support of the test and evaluation role of HQ MASSTER.

4. In addition to its role of rapidly providing support to the commander in the field, LWL must use its capabilities to provide prototype hardware; not only those prototypes developed in the course of providing rapid solutions for immediate problems, but also experimental prototypes which may satisfy an anticipated future military need. The goal in this instance need not be production of the item developed, but rather a clear understanding of the Army's need in a particular area without a costly and time-consuming formal definition process. One means to this goal may be LWL's capability of assembling essentially off-the-shelf components into a prototype which can demonstrate a concept.

5. In carrying out the goals described above, LWL will be expected to coordinate closely with the Combat Developments Command (CDC) and the Army Materiel Command (AMC) to provide improved means of type classifying selected equipment, and more rapid completion of the materiel acquisition process if it is decided that an item is to be produced in quantity. Funding or administrative constraints to the transition from LWL to a parent agency should be identified and removed by cooperative effort if possible; if not, OCRD should be notified in time to provide the necessary assistance.

W. C. GRIBBLE, JR.
Lieutenant General, GS
Chief of Research and Development

DEPARTMENT OF THE ARMY
HEADQUARTERS, UNITED STATES ARMY MATERIEL COMMAND
Washington, DC 20315

GENERAL ORDERS
NUMBER 35

9 February 1973

TC 020. Following unit REASSIGNED. No travel involved.

US ARMY LAND WARFARE LABORATORY, UIC WG5A, TDA M1W05AAA02, TPSN 56151, FPLAN CRX, Asg Mi, Station: Aberdeen, Maryland

Relieved from: Chief of Research and Development
Assigned to: Commander, US Army Materiel Command
Effective date: 15 February 1973
Morning reports: 1AW AR 680-1
Authority: Letter, DAAG-ASO-D, 2 February 1973, subject: Transfer of the US Army Land Warfare Laboratory
Special Instructions: All personnel and equipment transferred in place.

FOR THE COMMANDER:

OFFICIAL:

CHARLES T. HORNER, JR.
Major General, USA
Chief of Staff

JAMES P. CAHILL
Colonel, GS
Chief, HQ Admin Mgt Ofc

DISTRIBUTION:
A and B
20--HQDA (DAAG-ASO-D)
5--AMXMM-TO
3--AMCIG
3--AMCIN
8--AMXMM-TM
3--AMCRD
3--AMCDL
3--AMCPT-SA
3--AMCPT-SN
2--AMCIS-MR
6--AMCLA
10--AMCCP
1--HQDA (DAFD-MFA)
5--HQDA (DAFD-MFD)
1--CDR, USA Major Item Data Agency, Chambersburg, PA 17201
2--CDR, HQ, 1st Army, ATTN: AHAAG-BAM, Fort Meade, MD 20755
1--AMC Mil Pers Mgt Det, Edgewood Arsenal, MD 21010
5--US Army Land Warfare Laboratory
2--Office Chief of Research and Development (DARD-ZX)

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U. S. ARMY
LAND WARFARE LABORATORY
ABERDEEN PROVING GROUND
MARYLAND

LWL Directive
No. 31

2 March 1972

PROPOSED EVALUATION PLANS

I. PURPOSE:

The purpose of this directive is to provide guidance in the preparation of proposed evaluation plans for LWL equipment.

II. APPLICABILITY:

This directive is applicable to all personnel drafting, reviewing, or approving proposed evaluation plans.

III. SCOPE:

This directive covers the planning and instructions necessary for the preparation of operational evaluation plans. A format for the evaluation plan is provided in Annex A.

IV. CONTENTS:

RICHARD L. CLARKSON
Colonel, GS
Commanding

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1. DEFINITION

An evaluation is the operation of materiel by the user in locations or proceedings similar to expected field use or in actual combat operations.

2. GENERAL.

a. The main difference between USALWL with its quick reaction mission and other Army R&D agencies is that USALWL with CRD approval is permitted to work on tasks which do not, at the time of their initiation, have a validated requirement. These USALWL tasks are in response to specific field problems identified by USALWL Liaison Officers.

b. A satisfactory evaluation by the user of an item is of great importance to USALWL as it provides a means of quickly formalizing the field-identified problem into a validated Army need. It also provides, through the report of this evaluation, a vehicle by which the user can state the suitability of the USALWL item to meet the field problem. Using the statement of need from the user and his report on the suitability of the USALWL item to meet the need, USALWL is able to call an IPR to recommend appropriate type classification.

c. The relatively short duration of an evaluation makes the planning for it critical. The proposed plan with questionnaire is the important document in obtaining the user's statement on suitability. The purpose of any evaluation is to obtain information to support one of the following:

(1) Establishment of the design criteria.

(2) Determination that a given prototype approach is valid.

(3) Determination that the item is acceptable and operational quantities should be procured, or obtain a definitive statement of shortcomings which should be corrected prior to productions.

(4) Drafting of an appropriate Materiel Need Document.

The questionnaire should be developed so that the following can be determined as appropriate:

(1) Operational acceptability in general.

(2) Environmental suitability.

(3) Tactics and techniques used during the evaluation.

(4) Unique capabilities.

(5) Maintenance and training requirements.

(6) Recommended modifications.

A draft of the Proposed Evaluation Plan is sent to the major command headquarters of the unit which has stated its willingness to evaluate the item. Usually a project officer from that command headquarters then prepares an evaluation plan adapting or adopting the USALWL proposed plan. It is by means of this plan that the unit conducts the evaluation. The results of the evaluation provide the Project Officer with data for producing a statement as to the acceptability of the item.

3. RESPONSIBILITIES.

a. The task engineer is responsible for the preparation of the Proposed Evaluation Plan and questionnaire.

b. Coordination via the attached RDLW Form, Annex B, shall be completed not later than 60 days prior to estimated shipment date of the item(s).

c. Resolution of non-concurrences is the responsibility of the development division chief. [Any necessary further resolution will be by TD or CO]

d. The MOB officer will provide support to the task engineer in preparation of the proposed evaluation plan and questionnaire.

e. The MRB engineer will provide support to the task engineer during internal coordination per 3b and will transmit the approved plan to the evaluating field command(s).

4. PROCEDURE FOR PREPARING A PROPOSED EVALUATION PLAN

a. Approximately 90 days prior to the expected shipment date, the task engineer shall prepare a Proposed Evaluation Plan with Questionnaire following the outline and guidance contained in Annex A.

b. The task engineer will coordinate informally with Military Operations Branch and Materiel Readiness Branch for the inputs from MOD.

c. By use of the coordination sheet (Annex B), the Proposed Evaluation Plan will be circulated for formal approval. Title will be the task title; nature of request will be "PROPOSED EVALUATION PLAN".

d. Upon approval, the Plan will be given to MRB, together with manuals and other appropriate documents, for inclusion in the letter requesting evaluation, for mailing to the evaluating command approximately sixty days prior to shipment.

ANNEX A

FORMAT AND CONTENT OF LWL PROPOSED EVALUATION PLANS

The format of the Proposed Evaluation Plan should follow the outline below. [Depending upon the type of item to be evaluated, the detail of these sections may be greater or lesser but each section should be sufficient for attainment of a thorough evaluation.]

1. References:

a. Any document necessary for preparation of the Proposed Evaluation Plan should be included here (citations such as FM's, handbooks, etc).

b. List documents involved in the establishment of the task such as ENSURES, MN's, etc as well as communications relative to the evaluation.

c. Cite any historically important documents valuable in the presentation of the "Background".

2. Introduction:

State very briefly what the device is and what it does.

3. Background:

a. The Problem the Item Solves and the Method:

State the problem simply and tell how the item works to solve the problem.

b. History

In this section present a history of the task.

c. Testing Performed to Date:

Describe briefly the tests which have been conducted on the item and its prototypes during development and the results obtained. Important results which must be presented in detail and any available test data should be included as annexes.

4. Description of Materiel:

Give a concise, non-technical description of the physical characteristics of the item. Highly technical descriptive material, if needed, should be included as annexes.

5. Description of Operation:

Explain, step by step, how the item operates.

6. Purpose of Proposed Evaluation:

The evaluation Purpose should be defined by one of the following four statements:

a. The purpose of this evaluation is to establish design criteria.

b. The purpose of this evaluation is to determine the validity of the prototype approach.

c. The purpose of this evaluation is to determine if this item is ready for production in operational quantities or if not suitable, to specifically identify the shortcomings which make it unsuitable.

d. The purpose of this evaluation is to provide a basis for a Materiel Need document.

7. Time Schedule:

The time schedule is to be determined by the evaluating command. Recommend a training time based upon MOB's experience with the item. (The intent of this paragraph is to provide a planning document to the evaluator for his use.)

ITEM	TIME (Duration)
a. Training	
b. Operation	
c. Questionnaire response	
d. Report preparation	

8. Procedure:

In this section recommend the steps to be followed in the evaluation of the item. Include consideration of the sections of the evaluation plan eg: training, maintenance support, etc.

9. Training:

Explain the problem of training personnel in the operation, maintenance and/or repair of the item. If the Task Engineer or his representative is planning to accompany the item to the field, such fact should be included in this section. Particular support in consideration of this area should be obtained from MOB.

10. Support Requirements:

In this section, provide a comprehensive listing of all support required to properly run the evaluation (personnel, materiel, medical, transportation, etc.) and specify who must provide the support, LWL, the evaluating unit or another agency. Duration of said support should be estimated. Recommendations for troop unit and or site choice can be made. Informal prior coordination of this paragraph with the evaluating unit will avoid later disagreements.

11. Safety.

Refer to LWL Directive #19

A safety statement or waiver of need for safety statement will be one of the criteria addressed relative to safety in the Evaluation Plan.

12. Reporting Procedure:

A procedure for reporting the results of the evaluation should be considered. Dependent on the type of evaluation performed and results obtained, it might be desirable to have questionnaires returned, a summary report prepared by the Project Officer, or a command letter forwarded through channels, etc.

13. Disposition of the Items:

How the items are to be handled following the evaluation should be addressed. Expendables and salvageables might best be handled by the local command; failed items might be valuable for analysis; successful, workable items might have additional use in filling requests for evaluation elsewhere.

14. Miscellaneous:

Should any aspect of the evaluation plan not be addressed, elsewhere, it may be included at this location.

15. Preparation of Questionnaire:

a. In the preparation of the questionnaire keep in mind the idea of getting specific comments from the user. The minor points which may make the item subjectively very unacceptable to the user should also be brought out. The order in which questions are asked and their wording can affect the validity of the answers. Care should be exercised to see that questions do not influence objectivity. Generally, the order of the questions should relate to the sequence of the events in the evaluation. The questionnaire should address the following four major objectives of the evaluation plan.

(1) Performance of the item

(2) Suitability of item for intended purpose

(3) Training adequacy

(4) Manual adequacy

b. Performance:

The questionnaire should specifically address how well the item meets its design objectives under the factors relating to the theatre in which the evaluation is to be made. No mere duplication of previous tests should be proposed; rather, the effect on the performance parameters of the terrain, climate and operational environment of the area should be sought. Reliability is an element of performance.

c. Suitability:

Since user acceptability is the ultimate evaluation factor for any item of military hardware, the suitability of the item for meeting the problem is of paramount importance. The questionnaire should include specific questions on the suitability of the item and a comparison made with other items currently used to perform the same function. Acceptability from a maintenance standpoint can be highlighted through appropriate questions under this heading.

d. Training:

Normally, the operation manual should be sufficient for the training of the user. However, if the operation of the item is complicated and involved, prepare a training plan. This training plan should be tested and approved by MOD prior to shipment. The questionnaire should ask questions which will bring out the adequacy or inadequacy of the training plan.

e. Manual Adequacy:

The instructions, operation, and maintenance of an item are usually simple enough for a single manual. The adequacy or inadequacy of the manual to meet the needs of the user during evaluation should be covered in the questionnaire.

COORDINATION SHEET

TITLE: _____

NATURE OF REQUEST: _____

	Concur	Nonconcur	Approval	Initals	Date
Task Engineer Remarks:				____	_____
Branch Chief Remarks:	☐	☐		____	_____
Chief, Mil Opns Div Remarks:	☐	☐		____	_____
Division Chief Remarks:	☐	☐		____	_____
Technical Director Remarks:	☐	☐		____	_____
Commanding Officer			☐	____	_____

U. S. ARMY
LIMITED WAR LABORATORY
ABERDEEN PROVING GROUND
MARYLAND

LWL Directive
No. 10

7 FEB 1969

TESTING PROCEDURES

I. PURPOSE:

To establish procedures for requesting test support.

II. APPLICABILITY:

The provisions of these procedures are applicable to all personnel of the U. S. Army Limited War Laboratory.

III. PROCEDURE:

Requests for test support will be made to the Test Liaison Officer, Technical Support Division, in accordance with the procedures of Paragraphs 1, 2 and 4 as applicable.

IV. CONTENTS:

Robert W. McEvoy

ROBERT W. McEVOY
Colonel, GS
Commanding

This Directive supersedes LWL Directive No. 10 dtd 12 Dec 68.

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1. REQUEST FOR USE AND CONDUCT OF TESTS EMPLOYING USATECOM FACILITIES

a. Based on USATECOM letter dated 16 October 1967 and in order to more effectively utilize the facilities and services available through USATECOM and expedite LWL requests, all initial correspondence from LWL to USATECOM concerning test requests, test support (MTD), etc., will be generated by the LWL Test Liaison Officer and contain as much of the following information as possible:

(1) Test program request identification, e.g., LWL Task number, etc.

(2) Description of test item, model number, lot number, engineer drawings, etc.

(3) Information by which the priority of the test program can be established, i.e., Issue Priority Designator, Master Urgency List, SEA, etc.

(4) Test objectives.

(5) Specification or detailed test plan.

(6) Test data requirements with desired and acceptable accuracies.

(7) Background.

(8) Safety considerations.

(9) Security classification.

(10) Test schedule to include number of test items and delivery date of materiel to be tested.

(11) Special instructions.

(12) Type of report required and distribution.

(13) Desired type of test site.

b. Preliminary contact with possible sources for accommodating the requirement, i.e., USATECOM, MTD, ARDC, HEL, etc., will be accomplished by or in concert with the Test Liaison Officer after details have been provided to him by LWL task personnel. Suggested test areas, methods, details, test plan, etc., will be forwarded

by the LWL Test Liaison Officer to USATECOM in the initial letter with an info copy to the accommodating source. NOTE: The test plan will be forwarded as a guide, with latitude for additions, changes or deletions upon recommendations of the testing agency.

c. Upon receipt of a formal reply from USATECOM, including funding requirements, the Test Liaison Officer will notify the Task Officer, who will arrange for transfer of funds. All arrangements for final scheduling, technical information, changes, etc., will be finalized at this time by conference among the Task Officer, Test Liaison Officer and the USATECOM designated agency representative. After this, the Task Officer will deal directly with the USATECOM designated agency representative, keeping the Test Liaison Officer advised of major changes in the test program by info copies of correspondence, DF's, etc., concerning schedule slippage, additions, changes or deletions to the original test plan, additional requirements, etc.

2. REQUEST FOR USE AND CONDUCT OF TESTS ON LWL SPESUTIE ISLAND TEST AREA

a. All requests for use of the Spesutie Island test area will be submitted to the Test Liaison Officer, Technical Support Division.

b. For use of Spesutie Island after normal duty hours, a request must be submitted to the Test Liaison Officer 48 hours in advance of time of test.

c. When the area is to be used in conjunction with explosives, pyrotechnic, chemical, smoke, projectile tests, etc., the attached Test Scheduling Request will be used.

d. Maximum tolerated explosive limits for the Limited War Laboratory test area are defined as 1/2 pound open charge or two ounce cased or fragmenting charge.

e. For all other tests (non-explosive), a phone call to the Test Liaison Officer will serve the purpose. The Test Liaison Officer will determine which of the test area(s) meet the requirements so as not to conflict with other tests and enter it in the Test Area Log Book. The areas will then be scheduled by the Test Liaison Officer for the individual. The Limited War Laboratory Standing Operating Procedure (SOP) (Inclosure 1) will be used as the basic SOP for all explosive and/or pyrotechnic type tests. It is the responsibility of participants that this SOP is

satisfied in all respects. Any deviations from this SOP must be approved by the Commanding Officer, Limited War Laboratory.

f. All test requests requiring the use of explosives, pyrotechnics, smoke, etc., will be made known to the Test Liaison Officer a minimum of two days prior to the desired test date if at all possible. This is necessary to complete LWL/ARDC/APG Safety Requirements for hazardous operations. For non-hazardous type tests, the area can be assigned on a day-to-day, or if necessary, hour-to-hour basis, providing they do not conflict with other scheduled LWL tests. Every assistance will be given to the Task Officer in the accomplishment of the objectives of the test by both the Technical Support Division and the Test Liaison Officer.

g. LWL/ARDC have a mutual exchange of daily test schedules and activities on Spesutie Island. No testing will be conducted on the LWL test areas on Spesutie Island without prior approval of the Test Liaison Officer. This will avoid conflicts with other LWL testing as well as ARDC testing in the area.

3. USE OF LWL AMMUNITION STORAGE FACILITIES

a. The Limited War Laboratory has magazines on Spesutie Island for the storage of small quantities of immediate-use explosives.

b. Personnel will not store or remove explosives from these storage areas without the approval of the Test Liaison Officer. If the Test Liaison Officer is not available, contact Mr. Paul Coomes on Extension 3382.

c. An inventory/use record will be maintained listing the type and quantity of explosives in each magazine. These will be reviewed frequently to determine the need for continued storage, otherwise, they will be moved to the Materiel Test Directorate storage complex or destroyed.

d. Transportation of explosives, etc., will be done only in accordance with AMCR 385-224 (copy available at Test Liaison Office). The Technical Support Division has a vehicle approved for transporting explosives on Post. Transporting explosives off Post must be coordinated with MTD. These requirements to MTD must be coordinated by the Test Liaison Officer or Mr. Paul Coomes.

e. The LWL field trailers will not be used as magazines for overnight storage of explosives without prior approval by the Test Liaison Officer. If approved, the proper fire symbol will be placed on the trailer by the Task Officer and the fire department will be notified (Extension 3601) by the Test Liaison Officer.

4. USE OF LWL MARINE CRAFT

a. The LWL marine craft is only to be used in support of LWL tasks when deemed essential to the successful accomplishment of said test.

b. All requests for the LWL marine craft will be made to Technical Support Division a minimum of one day prior to use if at all possible.

(1) The requestor must provide an accurate description of intended use and also a detailed trip plan of operational movements in order to insure maximum safety at all times.

(2) The craft will only be operated by employees authorized by the Technical Support Division. The operators must familiarize themselves with General Marine Rules & Regulations as prescribed by U. S. Coast Guard, as well as APG and MTD Range Safety Procedures.

(3) The craft will not be authorized for use when Coast Guard warnings of present or impending weather conditions preclude use.

(4) Dangerous maneuvers, high speed operation in shallow water, excess speed and carelessness will be avoided at all times.

(5) The craft will not be permitted at distances greater than one mile from shore with less than two persons aboard. No more than six (6) persons will be allowed on board at any one time.

c. The Technical Support Division has the responsibility for operation, maintenance, modifications and storage of the craft, including assurance that the craft is in a safe operating condition. Prior to embarking, the operator will assure that items such as life preservers, gas, lights, compass and fire extinguisher, etc., are on hand. Maintenance log book information will be filled out by the operator upon completion of use.

5. USE OF LWL AIRCRAFT

If LWL or other aircraft are to be employed during tests at Spesutie Island, the Test Liaison Officer will be informed on each occasion. This is necessary to avoid conflict with other facilities, i.e., ARDC, MTD, etc., who may have tests scheduled at the same time.

2 Incl
1. SOP
2. Test Scheduling Request

STANDING OPERATING PROCEDURES FOR EXPLOSIVE AND/OR PYROTECHNIC TESTING ON SPESUTIE ISLAND

1. REFERENCE: AMCR 385-224, Section 2716.

2. PURPOSE:

The purpose of this procedure is to provide instructions for safe and efficient operations concerned with the testing of small quantities of explosive and/or pyrotechnic items within the disciplines of LWL.

3. RESPONSIBILITY:

The Task Officer in charge of a task will be responsible for application and enforcement of this SOP and for overall supervision of the test, to include taking the necessary action to protect by adequate cover or distance as specified by the Test Liaison Officer all personnel, equipment and facilities from any blast or fragments resulting from a test under his control. (For purposes of clarification in this SOP, the term "Task Officer" shall be construed to mean "that individual who has been delegated the authority by his supervisor or division chief the responsibility of conducting the test.")

4. SCHEDULE OF OPERATIONS:

Based on expected hazards, the Task Officer will include adequate information in his test plan so that proper danger zones may be established by the LWL Safety Officer in coordination with the MTD Range Control Unit.

5. LIMITS:

a. Personnel: Operating personnel are restricted to the number equired to conduct the test in a safe and efficient manner. Transient personnel are restricted to those having an official interest in the test. At no time will the total number of personnel present exceed the capacity of the bombproof or shelter. Operating personnel will never consist of less than two personnel, one of which will be in proximity of a telephone or some type of communication at all times.

b. Explosives: The amount of explosives permitted at the test site is restricted to the amount required to conduct the test safely and efficiently. Explosive quantities at the detonation site will not exceed the number of components required

to make up one static charge. Initiating devices will be stored apart from all other explosives unless they are integral parts of the items involved. As separate items, they will be retained in approved containers until just prior to assembly of the test items.

(1) No electrical firing circuit will be established within one quarter (1/4) mile of a radio transmitter or within one (1) mile of a radar unit unless operation of the latter unit has definitely been suspended for the duration of the static test.

(2) Ammunition at the test site will be protected from solar radiation by a suitable cover with an air space between the top of the cover and items to provide adequate ventilation.

(3) All testing involving ammunition and explosives will be tested only from a barricade or adequate protection with all personnel under adequate cover. Tests of non-explosive items will be conducted utilizing known safety procedures. The Task Officer will insure the safe conduct of the test in compliance with safety regulations at all times.

6. PROTECTIVE EQUIPMENT:

a. Ear plugs will be worn by all personnel during explosive testing, based upon the judgment of the Task Officer and Safety Officer.

b. Safety glasses or an approved face shield will be worn by all personnel handling explosives or devices which may fragment or detonate.

c Personnel engaged in amphibious operations will wear protective foot gear if dismounted from the vehicle in water.

d. Additional protective equipment such as hard hats, leather gloves, respirators and special protective equipment will be utilized as required by the nature of the test and potential hazards involved.

e. Personnel working in brush or wooded areas should use protective creams and/or lotions to insure protection from ticks, etc.

f. Proper materials handling equipment will be utilized by operating personnel at all times.

7. TOOLS:

Only safety tools of non-sparking material will be employed in any operation involving ammunition or explosives. Only tools in first class condition will be accepted, or allowed to be employed, by the supervisor of the job.

8. OPERATING EQUIPMENT:

The following equipment is deemed necessary for safe and efficient accomplishment of the mission and will be employed during ammunition testing.

(1) DuPont Blasting Volt-Ohmmeter or Blasters Galvanometer: To be used in tests of firing lines for determination of continuity, resistance and presence of possible stray currents.

(2) Firing Wire: Wire of accepted type (no smaller than 20 gauge) will be employed to establish the firing circuit. Firing wires will be twisted pairs.

(3) Grounding Rod: A copper grounding rod, 5/8" diameter and approximately four (4) feet long, will be positioned adjacent to the firing point as a means of grounding the firing wires prior to their final hook-up to the blasting machine for initiating the detonation.

(4) Blasting Machine or Battery: Of an adequate type and voltage to initiate the detonation.

(5) Detonating cord will be employed as the priming medium in detonation of any buried ammunition or explosives.

(6) Electric Blasting Caps: Special Engineer Type II or M6 caps will be employed as a detonating device. Caps of the same type and manufacture will be used when multiple detonators are involved.

(7) Water Containers: A suitable water container (galvanized can or equivalent of a "Lister Bag") will be available at all times to furnish water to employees engaged in demolition operation. The container should have the word "Water" painted thereon to prevent misuse.

(8) Safety Fuse: To be used as a device to prevent simultaneous detonation in multiple hook-ups or in event local conditions prevent employment of electric blasting caps in detonation of explosives.

(9) Two fire extinguishers, water type, will be available for fighting incipent fires.

(10) A special carrying box for transportation of electric blasting caps.

9. TYPICAL TESTING PROCEDURE: (Explosive Items)

The Task Officer shall take the following precautions prior to testing based upon information given by the Test Liaison Officer on the Test Scheduling Request form:

(1) If required, obtain clearances and notify adjacent test areas.

(2) The area is free of personnel, vehicles and equipment not in support of the test.

(3) The grounding rod will be driven to a minimum depth of two feet in a position to the rear of, and adjacent to, the firing shelter. Rod will be tested to insure that the resistance does not exceed 25 OHMS between the rod and the end of the firing wires.

(4) Twist the power ends of the firing wires together and attach to the ground rod so as to make a clean and secure contact. Extend the wires to the point of detonation and attach to the DuPont Volt-Ohmmeter to check the circuit for stray currents. If stray currents exist and cannot be eliminated, electric blasting caps will not be used, but non-electric caps and safety fuze employed instead.

(5) If no stray currents are encountered, attach the blasting cap to the primacord and firing circuit. The cap will be fastened to the primacord so that at least six inches of the latter extends beyond the cap at each connection. CAUTION: Uncoil the blasting cap leads by removing the cover of the cap, grasping the leads with one hand approximately six inches from the cap, wrapping leads around index finger, and stretching out the leads with the other hand. Do not remove shortout shunt from the cap until the moment of connecting firing wires.

(6) Return to bombproof, disconnect firing wires from grounding rod and attach them to the Volt-Ohmmeter to determine continuity of the circuit.

(7) If continuity is not determined, the Task Officer will disconnect the Volt-Ohmmeter, again ground the firing circuit to the grounding rod, and check the wires and connections to determine the correct cause of failure.

(8) When continuity is established, the Task Officer will, upon assurance that the danger area is all clear, give three (3) siren blasts spaced five seconds apart as a warning that firing is to commence. All personnel in the area will then take cover.

(9) The Task Officer will then attach the firing wires (these wires should be used only once) to the blasting machine and, upon signal from the supervisor or worker-in-charge, will detonate the charge. NOTE: When a blasting machine is used, the actuating device shall be in this individual's possession at all times. When a panel is used, the switch must be locked in the open position until ready to fire and the single key must be in his possession. Following the detonation of the explosive, one (1) siren blast shall be given indicating all clear. If the time lapse between the signal to fire and the detonation is more than three minutes, three (3) more blasts will be given.

(10) When non-electric caps and safety fuse are employed, the fuse will first be tested for burning rate. Approximately 5 to 6 inches will be cut from the roll and discarded before making the test. Under no circumstances will a length of fuse be used for detonation that has a burning time of less than 300 seconds. Ignite the fuse by means of a M60 time blasting fuse.

(11) When non-electric caps and safety fuse are employed, be sure that cap fuse well is free of any foreign matter before attempting to insert the safety fuse. Do not under any circumstances attempt to use a fuse which will not enter the well freely and without force.

(12) When the fuse is properly seated in the cap, place a standard type cap crimper over the cap at the fuse end, hold by the fuse and crimp cap to fuse. Improvised methods of crimping a cap are prohibited.

(13) After each detonation, the Task Officer will wait for five minutes and then inspect the surrounding area for unexploded items or material. Items or material such as lumps of explosives or unfused ammunition may be picked up and prepared for destruction in accordance with established procedures. Fused ammunition or items which may have internally damaged components will not be handled, but will be destroyed in place.

(14) When multiple detonations are planned, a series hook-up will be employed, with increasingly longer lengths of safety fuse employed in the leads to the explosive area to provide a series of detonations rather than one mass explosion.

(15) When items to be detonated are covered with earth, blasting caps should not be buried beneath the ground level with the initiating charge. The initiating explosives should be primed with detonating cord of sufficient length to reach up through the covering to a point where the blasting cap may be connected thereto above the ground level.

10. MISFIRES:

In the event of mistire, the Task Officer, after three unsuccessful attempts to fire, will disconnect the firing wires from the blasting machine and ground them securely to the grounding rod. All personnal will remain under cover for a period of thirty (30) minutes. For non-electric devices, the waiting period will start upon expiration of normal burning time of the safety fuse. Task Officer, alone, will leave the shelter and proceed to determine and correct the cause of failure. All other personnel will remain under cover until defects are corrected and the charge has been detonated. A minimum waiting period of two minutes will be observed by all personnel after detonation of the charge to prevent personal injury from falling fragments.

11. GENERAL SAFETY INSTRUCTIONS

No personnel assigned an area for testing shall enter any other unassigned area without first securing clearance from the Test Liaison Officer. All Task Officers utilizing test facilities for explosive items will sign a copy of this Standing Operating Procedure prior to engaging in any hazardous test activity. When any explosive and/or pyrotechnic test is being conducted, at least one of the personnel will have had prior practical experience in handling explosive and/or pyrotechnic items.

(1) Malfunctions - The Task Officer shall be alert to detect any evidence of malfunctions which may create a hazard to personnel and equipment. The Task Officer has the authority and responsibility to cease operations when a hazardous condition appears for which adequate protective measures are not available. Malfunctions of explosives which present a hazardous condition will be immediately reported to the Test Liaison Officer for appropriate action; however, the area will be blocked off and appropriately marked and the APG Safety Office and Fire Department will be notified. Under no conditions are dud devices to be handled without permission of the LWL Safety Officer.

(2) Housekeeping - It is mandatory that the highest order of housekeeping be maintained at and in the vicinity of the test area at all times. Policing of the area upon completion of the test is the responsibility of the Task Officer.

(3) Smoking will be permitted only at approved locations.

(4) Electronic Equipment - In order to minimize possible hazards involved with materials that are sensitive to R.F. energy, it is required that all electronic equipment which possesses the ability to emit R.F. be cleared through the Test Liaison Officer, Technical Support Division, for approval prior to actual use.

(5) Emergency - Dial "17" for any emergency, fire, accident, explosion, suspicious activities or other serious occurrences. Know where and in what area you are so that aid will not be misdirected. If possible, have one person stationed at the roadside to direct aid.

12. ELECTRICAL STORMS:

Preparation for demolition operations involving electrical firing circuits will not be made during the presence or approach of an electrical storm. Upon approach of a storm, the handling of munitions or explosives and the placement or check of firing circuits will be discontinued and all personnel will vacate the area until the storm has passed. However, in such cases where preparations have been completed prior to a storm approaching the area, the destruction may be accomplished provided there is no misfire.

13. A copy of this SOP will be conspicuously posted at the firing point during all explosive operations.

RECOMMENDING APPROVAL:

David C. Adams

DAVID C. ADAMS
Test Liaison/Safety Officer
U. S. Army Limited War Laboratory

Peter B. Ferrara

PETER B. FERRARA
Chief, Technical Support Division
U. S. Army Limited War Laboratory

Walter Kohout

WALTER KOHOUT
Acting Director of Safety
Aberdeen Proving Ground, Maryland

APPROVED:

Robert W. McEvoy

ROBERT W. McEVOY
Colonel, GS
Commanding

U. S. ARMY LIMITED WAR LABORATORY

TEST SCHEDULING REQUEST

TASK OFFICER _____ DATE _____

TASK NUMBER _____ PHONE _____

TITLE OF TEST _____

WORK ORDER NO. _____ DESIRED TEST DATE _____

DAYS PREPARATION _____ EST. DAYS TESTING _____

RANGE AREA _____

AREA CONFIGURATION NEEDED

Hard Pan ____ Soft ____ Gravel ____ Macadam ____ Wooded ____ Swamp ____
Water ____ Beach ____

FACILITIES DESIRED

Magazines ____ Temperature Units ____ Flight Clearances ____ Trailer ____
Temperature Desired ____ Metro Data ____ Patrol Boats ____ Generators ____
Bombproofs ____ Range Observers ____ Tractor ____ Demolition ____ Other __

SPECIAL EQUIPMENT TO BE USED

Nuclear ____ Explosive ____ Radar ____ Vehicle ____ Radio ____
Biological ____ Chemical ____

PHOTOGRAPHIC SERVICES

High Speed ____ Smear ____ Fastax ____ Still ____ Color ____ 16MM ____
35MM ____ Mitchell ____ Movies w/sound ____ Black & White ____

COORDINATING AGENCIES

USATECOM ____ MTD ____ Edgewood Arsenal ____ HEL ____ ARDC ____ APG ____
Outside Agencies ____ Other ____

TYPE OF TARGET

Accuracy ____ Bursting Screen ____ Gun Model ____ Recovery ____ Weapon ___
Caliber ____ Tank ____ Sleigh ____ Motor ____ Other ____

STANDING OPERATING PROCEDURE TEST WILL BE CONDUCTED UNDER _____

David C. Adams
Test Liaison Officer
USALWL, Extension 3370

CRDLWL Form 1024

20 SEP 71

HEADQUARTERS
US ARMY LAND WARFARE LABORATORY
ABERDEEN PROVING GROUND, MARYLAND 21005

HEADQUARTERS
MODERN ARMY SELECTED SYSTEMS
TEST, EVALUATION, AND REVIEW (MASSTER)
WEST FORT HOOD, TEXAS 76544

MEMORANDUM OF AGREEMENT
ON
US ARMY LAND WARFARE LABORATORY LIAISON OFFICER TO MASSTER

1. PURPOSE. The purpose of this memorandum is to identify responsibilities, establish relationships and outline procedures which can serve as an agreed basis for operations between MASSTER and the Land Warfare Laboratory (LWL), Office, Chief of Research and Development, in the execution of their interrelated responsibilities for development, test and evaluation of materiel items of potential value to the US Army.

2. OBJECTIVES. The Commanding Officer, LWL is providing a Liaison Officer to MASSTER for the objectives of:

a. Providing to MASSTER ready access to the quick-reaction, multidisciplinary capabilities of LWL to assist in accomplishment of the MASSTER mission.

b. Promoting an understanding between MASSTER and LWL personnel of the mission and capabilities of the two agencies.

c. Facilitating the exchange of information between LWL and MASSTER concerning activities in the two agencies.

d. Supporting the test and evaluation of LWL-developed equipment at MASSTER.

3. RESPONSIBILITIES. For purposes of this memorandum, the responsibilities of MASSTER, LWL and the LWL Liaison Officer are as follows:

a. LWL Liaison Officer will:

(1) Serve in the liaison capacity for a period of 90 days.

(2) Promote and provide an effective flow of information between the two agencies on the activities of each that are of interest to the other.

(3) Although not serving as a task officer or project engineer, provide to MASSTER upon request such technical information, advice and assistance as he is personally qualified to provide.

(4) Monitor MASSTER tests, evaluating and projects, particularly those concerning LWL items, and relay appropriate information to LWL.

(5) Ensure that MASSTER is informed of current LWL projects.

(6) Transmit expeditiously to LWL appropriate problem areas and requests for assistance as presented by MASSTER or determined by observation.

(7) Familiarize himself with the operation of MASSTER, the test environment and the items currently under test.

(8) Follow through by the most expeditious means on LWL items being prepared for and furnished to MASSTER for test and evaluation.

(9) Report to the designated MASSTER Division for administrative and logistic support.

b. USALWL will:

(1) Designate and inform MASSTER of the individual selected as LWL Liaison Officer.

(2) Inform MASSTER of the successor approximately 30 days prior to the expiration of the tour of the incumbent LWL Liaison Officer.

(3) Provide necessary funds for travel and TDY expenses, including funds for liaison visits to nearby military installations and to LWL as required.

(4) Respond expeditiously to requests from MASSTER for assistance.

c. MASSTER will:

(1) Provide administrative support, including office, filing space, telephone, and secretarial/clerical assistance.

(2) Provide logistic support, including vehicle and/or helicopter as appropriate to enable LWL Liaison Officer to witness MASSTER tests.

(3) Provide for attendance of the LWL Liaison Officer at appropriate briefings and meetings from which he may gain information to assist in accomplishment of his mission.

Richard L. Clarkson

RICHARD L. CLARKSON
Colonel, GS
Commanding
USALWL

G. P. SEneff, Jr.

G. P. SENEFF, JR.
Lieutenant General, USA
Commanding
MASSTER

DEPARTMENT OF THE ARMY
CHIEF OF RESEARCH AND DEVELOPMENT
WASHINGTON, D. C. 20310

DEPARTMENT OF THE ARMY
HEADQUARTERS
UNITED STATES ARMY COMBAT DEVELOPMENTS COMMAND
FORT BELVOIR, VIRGINIA 22060

MEMORANDUM OF AGREEMENT
ON
TEST AND EVALUATION OF OFF-THE-SHELF MATERIEL AND EQUIPMENT

1. PURPOSE. The purpose of this memorandum is to provide an agreed basis for operations between the US Army Combat Developments Command (USACDC) and the Limited Warfare Laboratory (LWL) Office of Chief, Research and Development, in the execution of this interrelated responsibilities for test and evaluation of nonstandard (off-the-shelf) commercial items of materiel and equipment of potential value to the US Army.

2. REFERENCES.

a. AR 10-12 "United States Army Combat Developments Command".

b. AR 71-1 "Army Combat Developments".

c. AR 705-5 "Army Research and Development".

d. AR 70-10 "Army Materiel Testing".

3. OBJECTIVES. The specific objectives of this memorandum are to identify responsibilities, establish relationships, and outline procedures to the USACDC and the LWL for the accomplishment of those elements of their respective missions which involve matters of mutual interest. It is intended to promote a better understanding between the USACDC and the LWL, to facilitate the exchange of information, to assure insofar as possible the test and evaluation of nonstandard (off-the-shelf) commercial items of materiel and equipment of potential value to the US Army, all with the view toward evaluation of such materiel and equipment for acceptability for issue to troops in the least amount of time at the lowest practicable cost. It will be used by the CG USACDC and CO LWL as a basis for developing more detailed directives applicable within their respective commands.

4. RESPONSIBILITIES. For purposes of this memorandum, the responsibilities of the USACDC and the LWL are as follows:

a. USACDC will:

(1) Identify items of materiel and equipment available from commercial sources which are considered to be of potential value to the US Army.

(2) Forward a list of items of materiel and equipment identified for test to CO LWL for his determination of feasibility of test within his mission and resource limitations. List of items forwarded will contain the objectives of the test to be conducted and all the information as to the nomenclature, source, cost, etc., required by the LWL to determine those items for LWL tests.

(3) Provide necessary funds, and other assistance within capabilities and assigned mission that may be required to accomplish required testing. Funds will be provided to cover costs of procuring and shipping the required number of items of materiel and equipment and other direct costs in support of test.

(4) Designate items of materiel that cannot be tested as reported by LWL due to resource limitations to CRD for possible testing by other developing agencies.

b. LWL will:

(1) Review the list of items of materiel and equipment submitted by CG USACDC and determine feasibilitity to test within LWL resource limitations.

(2) Advise CG USACDC of items accepted for test and provide outline plan of test, cost estimates, programmed test dates and any special requirements for accomplishing the test.

(3) Dispose of test materiel in accordance with established procedures.

(4) Provide to CG USACDC 10 copies of report of test within 30 days after completion.

A. W. BETTIS
Lieutenant General, GS
Chief of Research and Development

HARRY W. O. KINNARD
Lieutenant General, US Army
Commanding

1 OCT 1968

DEPARTMENT OF THE ARMY
CHIEF OF RESEARCH AND DEVELOPMENT
WASHINGTON, D.C. 20310

DEPARTMENT OF THE ARMY
HEADQUARTERS
U. S. ARMY COMBAT DEVELOPMENTS COMMAND (USACDC)
FORT BELVOIR, VIRGINIA 22060

MEMORANDUM OF AGREEMENT
ON
LIAISON AND COORDINATION

1. PURPOSE: The purpose of this memorandum is to identify responsibilities, establish relationships and outline procedures which can serve as an agreed basis for operations between USACDC and the Land Warfare Laboratory (LWL), Office, Chief of Research and Development, in the execution of their interrelated responsibilities for development, test and evaluation of materiel items of potential value to the U. S. Army.

2. REFERENCES:

a. AR 10-12, "United States Army Combat Developments Command."

b. AR 11-25, "The Management Process for Development of Army Systems."

c. AR 70-10, "Test and Evaluation During Development and Acquisition of Materiel."

d. AR 71-1, "Army Combat Developments."

e. AR 71-6, "Type Classification/Reclassification of Army Materiel."

f. AR 700-35, "Product Improvement of Materiel."

g. AR 705-5, "Army Research and Development."

h. AR 705-9, "Materiel Status Committee Functions."

i. DA Pam 11-25, "Life Cycle Management Model for Army Systems."

j. Letter, DARD-DDS, OCRD, DA, 23 Nov 71, subject, "US Army Land Warfare Laboratory."

3. OBJECTIVES:

a. Provide to USACDC ready access to the quick-reaction, multi-disciplinary capabilities of LWL to assist in accomplishment of the USACDC mission.

b. Promote an understanding between USACDC and LWL personnel of the mission and capabilities of the two agencies.

c. Facilitate the exchange of information between LWL and USACDC concerning activities in the two agencies.

d. Promote coordination in the test, evaluation and appropriate type classification of LWL-developed equipment.

4. RESPONSIBILITIES: For the purposes of this memorandum, the responsibilities of the LWL and USACDC are as follows:

a. LWL will:

(1) Forward to CDC for comment applicable tasks in the LWL FY Program.

(2) Forward CDC comments to OCRD.

(3) Provide quarterly Fact Sheets of ongoing LWL tasks to CDC for information and comment on newly initiated tasks.

(4) Provide at least a monthly liaison visit to CDC Headquarters of an individual sufficiently familiar with LWL's operation to assure that there is an effective flow of information on activities of mutual interest.

(5) Be responsive to CDC requests, within the financial and personnel resources of LWL, for support in accomplishing the mission of CDC.

(6) Coordinate field evaluation efforts with particular attention to preparation of appropriate MN type documents and those actions leading to type classification of the materiel items per AR 71-6.

b. CDC will:

(1) Provide appropriate comments relative to the tasks proposed by LWL.

(2) Initiate action to make use of LWL's quick-reaction, multi-disciplined capabilities in support of CDC's mission.

(3) Designate a point of contact in headquarters CDC through which LWL liaison visits and communications can be coordinated.

(4) Provide recommendations on LWL proposals for type classification action in accordance with AR 71-6.

5. TERM OF AGREEMENT: This agreement is effective until rescinded, revised, or superseded.

6. RESCISSION: This agreement replaces the MOA between CRD and CG, USACDC on Test and Evaluation of Off-the-Shelf Materiel Equipment, 15 Oct 68, and the USACDC and USALWL MOU on Procedure for Validation of Limited War Laboratory Projects, undated.

JOHN NORTON
Lieutenant General, USA
Commanding General
US Army Combat Developments Command

W. C. GRIBBLE, JR.
Lieutenant General, GS
Chief of Research and Development

13 JUL 1972

LISTING OF THE ITEMS OF IPE LOCATED AT LWL

Tag No.	Description of Items
USA A23080-01162	Saw, band, standard upright type 30" wheel DIA 15" height under guide
USA A23080-01163	Sander, single disk 20" dis DIA
USA A23080-01164	Jointer, straight bed type 16" cutting width 96" O/A Table LG
USA A23080-01161	Surfacer, single cylinder type 18" max work width 6" Max work thk
USA A23080-01160	Boring machine, vertical, 1 head 9" max spindle stroke 24" TBL width 32" TBL length
USA A23080-01165	Cut off machine, hack, manual, multiple speed, 6" WK W 6" WK THK
USA A23080-01166	Sawing and filing machine, band, contour, multiple speed, tilting table, mechanical feed 26" THT 13" WK THK
W23HYY-03130	Electrical disintegrating machine, stationary, manual, 18" LG x 17" W TBL 9" STR
USA A23080-01140	Drilling machine, upright, box column, single spindle, bench type, plain table, hand feed, 5/16" drill cap., 20" SWG
USA A23080-01158	Drilling machine, upright, box column, single spindle, floor type, plain table, hand feed, 1" drill cap., 30" SWG
W23HYY-02684	Drilling machine, upright, box column, single spindle, floor type, positioning table, nucon, perf tape, geared feed, 1-1/2" drill cap., 15"x20" Dr area

LISTING OF THE ITEMS OF IPE LOCATED AT LWL

Tag No.	Description of Items
W23HYY-02733	Drilling machine, radial, floor type, plain head, geared feed, 1-1/2" drill cap., 4' arm lg
USA A23080-01167	Grinding machine, cylindrical, external, center type, universal, traveling table, 14" SWG; 30" CC
USA A23080-01169	Grinding machine, surface, reciprocating, horizontal spindle, traveling table, 10" X 24" GR Surf.
A23080-DTP12821	Grinding machine, tool and cutter, universal, floor mounted, 10" SWG; 27" LG work
USA A23080-01168	Grinding machine, tool and cutter, engraving, bench mounted, 5/8" DIA shank; 6" DIA wheel
USA A23080-01129	Lathe, engine, manual, 11" SWG O/Bed; 18" CC
USA A23080-01130	Lathe, engine, manual, 11" SWG O/Bed; 18" CC
USA A23080-01131	Lathe, engine, manual, 11" SWG O/Bed; 18" CC
USA A23080-01146	Lathe, engine, manual, 12" SWG O/Bed; 20" CC
USA-01-81-000938	Lathe, engine, manual, 19" SWG O/Bed; 54" CC
USA A23080-01152	Lathe, engine, manual, 19" SWG O/Bed; 54" CC
USA A23080-01141	Milling machine, bench type, knee, horizontal, pl- H-F, manually operated, 14" longtd TT;5-1/2" cross TT; 13-1/4" vert. knee TVL

LISTING OF THE ITEMS OF IPE LOCATED AT LWL

Tag No.	Description of Items
USA A23080-01211	Milling machine, bench type, knee, horizontal, pl, H-F, manually operated, 14" longtd TT; 5-1/2" cross TT; 13-1/4" Vert. knee TVL
USA A23080-01172	Milling machine, knee type, horiz., plain, sm-auto operated, 28" longtd TT; 10" cross TT; 18" vert. knee TVL
USA A23080-01171	Milling machine, knee type, horiz., plain, sm-auto operated, 28" longtd TT; 10" cross TT; 18" vert. knee TVL
USA A23080-01209	Milling machine, knee type, vert., sliding head, sm-auto operated, 28" longtd TT; 12" cross TT; 14" vert. knee TVL
USA A23080-01132	Milling machine, knee type, vert., swivel head ram, sm-auto operated, 22" longtd TT; 10" cross TT; 17" vert. knee TVL
USA A23080-C [illegible]	Milling machine, knee type, vert., rotary head, sm-auto operated, 18" longtd TT; 12" cross TT; 18" vert. knee TVL
USA A23080-01170	Engraving machine, pantograph, 2 dimensional, Sgl Spdl; 10 = 1 ratio; 1 in. W X 1-3/4 in. lg max rect ctg cap.
USA A23080-00541	Shaper, horizontal, mechanical, plain table, 12" str, 17-5/8" horizontal TT, 14-1/4" vert. TT
USA A23080-01173	Honing machine, mandrel type, floor mounted, wet, manually operated, 6" max honing DIA 18" max Wk lg Cap.

LISTING OF THE ITEMS OF IPE LOCATED AT LWL

Tag No.	Description of Items
W23HYY-03128	Welding machine, rectifier type, AC-DC arc, gas shielded, 300 AC amp rating 300 DC amp rating 60% duty cy 10 to 395 AC amp rg
USA A23080-01276	Welding machine, resistance, spot, direct energy, single phase, press type, air operated, 75 KVA; 30" throat D
W23HYY-03131	Bending brake, box and pan, manual, 12 Ga thk, 48" W
USA A23080-00869	Bending machine, ram, table and pin, horizontal, pneumatic, 12 T; 2" STR
USA A23080-02653	Bending machine, rotary head, bar, hydraulic, 1" bar
USA A23080-01159	Press, hydraulic, vertical, straight sided, arbor, single action, moving down, travel head, 80 T; 13" STR
USA A23080-01174	Press, hydraulic, vertical, C-frame, single action, moving down, non-guided ram, 6 T; 10" STR
USA A23080-01149	Punching machine, turret, manual, 18 STA; 14 Ga Pl THK; 2" DIA punch
USA A23080-01175	Shearing Machine, plate, squaring, mechanical, 10 Ga THK; 4'4" W
USA A23080-01210	Metal stitching machine, throat type, mechanical power, 18 Ga wire; 15" THT
USA A23080-01176	Rotary table, circular, plain, manual, vernier scale 16" DIA table

LISTING OF THE ITEMS OF IPE LOCATED AT LWL

Tag No.	Description of Items
USA A23080-01128	Lathe, universal, horizontal 16" max SWG O/Bed 4.000" spindle hole DIA 3.000' Max length between spindles
W23HYY-03129	Engraver, printed circuit board, scanning-cutting type, single head, 12" max panel W; 18" max panel LG
W23HYY-03124	Voltmeter, differential, bench type AC-DC type, 30 CPS to 5KC 0 to 1100 V AC in 4 ranges 0 to 1100 V DC in 4 ranges
	Multimeter; digital, bench type, AC-DC type, 10 Hz to 300 Khz; 0 to 1000 V AC; 0 to 1000 V DC; 0 to 10 megohms
USA A23080-01127	Meter, radio interference and field intensity 150 kc to 25 mc
USA A23080-01126	Meter, Radio Interference and field intensity 150 KC to 1 GC
W23HYY-03125	Analyzer, spectrum, crt display, bench type 10 MC to 40 GC 4" CRT
W23HYY-02992	Analyzer, spectrum, oscilloscope plug-in, 0 to 1.8 Ghz
W23HYY-03120	Counter, frequency, w/o plug-in converter features, bench type 10 cps to 1 Mc 6 digit display
USA A23080-01142	Counter, frequency, w/o plug-in converter features, bench type, 0 to 10 Mhz 7 digit display
W23HYY-03117	Counter, frequency, w/o plug-in converter features, bench type, 0 to 20 Mhz 7 digit display

LISTING OF THE ITEMS OF IPE LOCATED AT LWL

Tag No.	Description of Items
USA A23080-01134	Counter, frequency, w/o plug-in converter features, rack mount type, 10 CPS to 10 MC, 7 digit display
W23HYY-03118	Counter, frequency, plug-in type, 0 to 225 Mhz
USA A23080-01139	Oscilloscope, Gp, Sgl beam, bench type, w/o plug-in features, DC-15 MC vert. BP,4"CRT, 10 MV/ Div vert. sens
USA A23080-01151	Oscilloscope, gp, SGL,beam, bench type, w/o plug-in features, DC-15 MC vert. BP,4"CRT, 10 MV/ Div vert. sens
USA A23080-01150	Oscilloscope, Gp, Sgl beam, bench type, w/o plug-in features, DC-15 MC vert. BP,4"CRT, 10 MV/Div vert. sens
USA A23080-01177	Oscilloscope, gen prp, sgl beam, bench type, w/o plug-in features DC-150 MC vert bandpass 4" CRT
USA A23080-01257	Oscilloscope, general purpose, single beam, bench type w/o plug-in features DC to 150 MC vert. bandpass 4"CRT
W23HYY-02868	Oscilloscope, general purpose, single beam, bench type, with plug-in features, w/o 2nd time base generator, 8 CM vert. defl.
W23HYY-03122	Oscilloscope, general purpose, single beam, bench type, with plug-in features, w/o 2nd time base generator, 8 CM vert. defl.

LISTING OF THE ITEMS OF IPE LOCATED AT LWL

Tag No.	Description of Items
USA A23080-00996	Oscilloscope, Gp, Sgl beam, bench type, w/plug-in features, w/o 2nd T base gen, DC-15 MC vert. BP,6 CM vert. deflection
USA A23080-00998	Oscilloscope, Gp, Sgl beam, bench type, w/plug-in features and 2nd T base gen, DC-30 MC vert. BP, 4 CM vert. deflection
USA A23080-01145	Oscilloscope, Gp, dual beam, bench type, w/o 2nd T base gen, DC-1MC vert. BP, 10 CM vert. deflection
W23HYY-03121	Oscilloscope, general purpose, dual beam, bench type, with 2nd time base generator DC to 1 Mhz vert. bandpass; 8 CM vert defi.
USA A23080-00999	Oscilloscope, Gp, dual beam, bench type, w/2nd T base gen, DC-30 MC vert. BP, 6 CM vert. deflection
USA A23080-01125	Oscilloscope, general purpose, dual beam, rack mount type, with 2nd time base generator 10 CM vert. deflection
W23HYY-03123	Oscilloscope, storage, bench type, 6.5 inch CRT
USA A23060	Recorder, ink writing, strip chart, bench type AC-DC type, DC to 200 CPS 2 channel
USA A23080	Recorder, ink writing, strip chart, bench type AC-DC type, DC to 200 CPS 2 channel
W23HYY-03133	Recorder, ink writing, x-y, bench type, DC to 6 Hz; 1 channel
USA A23080-01002	Recorder, light beam writing, strip chart, bench type AC-DC type, DC to 5 KC 18 channel

LISTING OF THE ITEMS OF IPE LOCATED AT LWL

Tag No.	Description of Items
W23HYY-03059	Recorder, combination writing AC-DC type, DC to 100 CPS 2 channel
USA A23080-01133	Recorder, combination writing, AC-DC type, DC to 200 CPS, 2 channel
USA A23080-01148	Recorder, digital, bench type 5 lines/sec max print rate 11 column capacity
W23HYY-03116	Amplifier, audio frequency-radio frequency rack mount type, 2 Hz to 210 Khz; 1 channel
USA A23080-01268	Generator, signal, bench type, .005 Hz to 3 Mhz; 0 to 5 V output
W23HYY-03126	Generator, signal, bench type, 0.0005 Hz to 10 Mhz; 0 to 20 V P-P output
USA A23080-01001	Generator, signal, bench type 10 to 420 MC in 5 ranges 0.1UV to 500 MV output
USA A23080-01143	Generator, signal, bench type 10 to 455 MC in 5 ranges 0.1 UV to 500 MV output
W23HYY-03127	Generator, signal, bench type 450 MC to 1.230 GC 0.1 UV to 500 MV output
USA A23080-01000	Generator, sweep, bench type, w/o plug-in features, 10 KC to 220 MC, 12 RG, 50 CPS to 30 MC sweep
W23HYY-03068	Analyzer, differential thermal type, 2912 defg. max
W23HYY-03069	Analyzer, trace hydrocarbon, 2 PPM max

LISTING OF THE ITEMS OF IPE LOCATED AT LWL

Tag No.	Description of Items
W23HYY	Chromatograph, combination detector type, -85 thru plus 752 degf. RG
W23HYY	Integrator, digital, chromatograph analysis type, 8 digit display
USA A23080-01004	Cathetometer, vertical measuring type 40" lg of scale
USA A23080-01003	Spectrophotometer, indicating, multispectrum 0.21 to 1 micron RG
USA A23080-01005	Microscope, polariz, vertical body, monocular eypc, tur typ 4 pos nspc, sfcntnlt sce, grad rd slid stg, IRIS w/cond substage
W23HYY-03115	Amplifier, transducer, servo type, 4 channel input, 1 channel output

DEPARTMENT OF THE ARMY
U. S. Army Limited War Laboratory
Aberdeen Proving Ground, Maryland 21005

LWL Directive
No. 35

1 DEC 1969

TRAINING

I. PURPOSE:

To establish policies, announce responsibilities and prescribe procedures pertaining to the training of civilian personnel.

II. APPLICABILITY:

This directive is applicable to the training of all LWL civilian personnel.

III. SCOPE:

This publication enunciates Laboratory policy, prescribes procedures and establishes responsibilities relating to identification of requirements, selection of personnel and execution of training of civilian employees. Guidance provided herein is pertinent to career development of individuals as well as to the technical training required to support the Laboratory mission.

IV. CONTENTS:

RUDOLPH A. AXELSON
Colonel, GS
Commanding

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1. POLICY:

a. To provide training necessary to assure maximum efficiency of civilian employees and to encourage employees in their efforts for self-improvement.

b. To support training and development of individuals as a direct means of achieving maximum efficiency.

c. To support long term (120 consecutive training days or more) training in technical and professional areas. This support will not exceed training of 3 individuals at one time and should be distributed among the divisions as equitably as possible while maintaining an individual approach.

d. To give priority to support of long term training necessary for basic professional competence rather than for advanced degrees.

e. To support training in all elements of the Laboratory.

f. To support appropriate short term courses (1 to 2 weeks) at Government or non-Government facilities.

g. Race, creed, color, national origin, sex or grade will not be considerations in selection of individuals for training. The needs of the service and the individual's career development will be the principal selection criteria.

h. Payment of training costs:

(1) Normally costs of training in Government facilities will be borne by the Government.

(2) Costs of training in non-Government facilities will normally be borne by the Government when training is directly related to the employee's performance in his present assignment or the planned future assignment.

(3) The Government will frequently share training costs when the training is related to an employee's work assignment even though it may not be required for actual work performance. In certain situations the Government will share costs when proposed training will improve the employee's general value to the Department of the Army in present or future job assignments.

2. REQUIREMENTS:

a. Basic long term training requirements are normally developed by the supervisor in close coordination with the individual employee and reflect both the needs of the Laboratory and the career objectives of the individual. The requirements for training within a specific fiscal year should reflect the supervisor's judgment of a reasonably attainable objective for the period in question. All long term training requirements for the individual should not be repeated in the annual training program.

b. The need for training may be determined by the supervisor or management based upon a decision to discard established work processes in favor of adoption of more modern and efficient work methods.

c. Requirements for training may result from group needs, for example, all newly assigned supervisors must complete the 418 Supervisor Development Program.

3. PROCEDURES:

a. Programmed Training

(1) Upon call of the Chairman of the LWL Training Committee, each division chief will develop and submit a proposed annual training program for all elements of his division. Normally this submission is required by 1 May covering the fiscal year beginning the following July 1.

(2) Upon call of the Chairman, the LWL Training Committee will meet to consider those aspects of the proposed training program specified by the Chairman of the Committee.

(3) The LWL Training Committee through the Chairman recommends a proposed annual training program to the Commanding Officer and following approval, this program is submitted to the Chief of the Training & Development Branch, Civilian Personnel Division, for execution. The annual training program, after it has been approved, should be used as a guide for planning purposes and not viewed as a commitment that listed personnel will attend a particular course. The workload, availability of funds and training spaces must be considered, as well as a possible shift of Laboratory emphasis.

(4) The Training & Development Branch, Civilian Personnel Division, will coordinate and pool training resources and facilities at APG and other Government installations as appropriate to satisfy these training requirements. Where Government training facilities are not available, non-Government facilities may be utilized if appropriate.

(5) As training spaces for specific courses become available, the Training & Development Branch, Civilian Personnel Division, will advise the Chief, LWL

Administrative Services Branch who will advise the individuals concerned to complete applicable forms necessary for attendance. When spaces provided are fewer than stated requirements, the Chairman of the LWL Training Committee will select attendees based on existing workloads and other pertinent criteria.

b. Non-Programmed Training

Special training needs arising during the fiscal year will be requested on EAP Form 1084 for training at a non-Government facility or by Disposition Form if training is to be at a Government facility. These training requirements will be routed through supervisory channels to the Chief, Administrative Services Branch for processing and coordination with the Chairman of the LWL Training Committee, as appropriate.

4. RESPONSIBILITIES:

a. The Chairman, in conjunction with members of the LWL Training Committee, is responsible for:

(1) Planning, coordinating and evaluating current and long range training requirements of individuals as well as the overall training requirements in support of the operational needs of the Laboratory.

(2) Recommending to the Commanding Officer approval of Government sponsored training.

(3) Recommending to the Commanding Officer approval of training of 80 hours or less in a non-Government facility.

(4) Recommending to the Commanding Officer proposals for requesting OCRD approval for training in non-Government facilities in excess of 80 hours.

(5) Establishing priorities when nominees exceed available spaces.

(6) Convening the LWL Training Committee to consider problems pertinent to the LWL training program.

b. The Supervisor is responsible for:

(1) Continuing analysis of the training requirements and accomplishments of the individuals under his supervision as well as the needs of the elements of the organization for which he is responsible.

(2) Preparing, upon call, his segment of the proposed training program for a specific fiscal year.

(3) Taking all practical actions to assure that individuals are made available for programmed training when spaces become available.

c. Chief, Administrative Services Branch is responsible for:

(1) Acting as the focal point in LWL for training applications and associated actions. He will coordinate with Chairman of the Training Committee for special cases and maintain a central information point for the details of the LWL Training Program.

(2) Advising LWL personnel on forms and procedures pertinent to initiation of training requests.

(3) Providing security clearances when required in conjunction with programmed training.

d. Training & Development Branch, Civilian Personnel Division, is responsible for providing training services as outlined in APGR 690-3.

EXHIBIT 15

Statement of LWL Operational Philosophy

13 JUN 1973

US ARMY LAND WARFARE LABORATORY
ABERDEEN PROVING GROUND, MARYLAND 21005

1. Mission: To provide a centralized quick reaction research and development facility for accomplishing development of specialized military items and for the generation of new ideas for such materiel.

2. Roles: LWL performs a number of roles which further the execution of Program 6, Research and Development as administered by HQ Army Materiel Command (AMC). Among the more common roles are:

a. Rapid development of a prototype to examine the validity of a concept. New technology may be involved or a new application of well-known technology. The purpose is often to determine whether or not the Army has a requirement and to help define a materiel need by demonstrating technical feasibility. The construction and evaluation of simple prototypes can often be the most efficient means of gaining information needed for development decisions.

b. Prototyping to provide an immediate solution to a problem encountered by a field commander. Through frequent visits and permanent liaison arrangements with major commands around the world, LWL personnel are constantly looking for ways in which the R&D community can assist field commanders. Many ENSURES and limited production buys have resulted from this effort. Emphasis is now being placed on getting these limited production items introduced into the Army on a more permanent basis when it is appropriate.

c. Pursuit of somewhat longer term developments to examine possible military applications of a wide variety of scientific phenomena. The annual program reflects a reasonable percentage of such exploratory tasks to insure that the Laboratory has a continually updated reservoir of technology in all its many disciplines. This permits rapid reaction with a number of alternatives when the Laboratory is called upon to solve a problem and also results in the generation of new ideas and new concepts.

d. Purchase and evaluation of off-the-shelf commercial items to determine military potential. This program (formerly known as TECHAT) provides to the Army information on which to base recommendations for adoption of equipment. Use of commercial items with only slight modification to meet Army needs is a highly cost-effective means of materiel acquisition. LWL provides purchasing and contracting arrangements, in-house testing, arrangements for user evaluation and a report of the results.

e. Quick studies and technical alternatives. Because of its commodity-oriented structure, AMC tends toward monopolistic subordinate commands and the AMC HQ staff is at a technical disadvantage in dealing with groups of experts in any given field. For those situations when lack of time and technical depth on the staff make some additional expertise necessary, LWL can apply its multidisciplinary talents to provide technical alternatives and objective recommendations concerning courses of action. Another facet of this role is LWL's ability to pull together and manage at a low level developments involving technologies which would normally require AMC HQ management over two or more commodity commands.

The roles discussed above are not distinct. A prototype designed merely to demonstrate a concept may, in fact, prove to be a good interim or partial solution to a problem. Some prototypes developed for a particular environment have turned out to have world-wide application. Two key points emerge from the discussion: first, evaluation of prototype hardware permits the user to make much more confident decisions on materiel needs than can be made on paper studies; and second, the Army must have the means of reacting quickly to a change in threat or environment with an interim or partial solution which can provide relief while the long-range solution is being developed.

3. Characteristics: LWL has certain unique characteristics which derive from its charter, its organization, its personnel, and its relationship with other agencies.

a. Approved DA validated requirement (ROC) not required prior to task initiation. A provision of the LWL charter permits the CO, LWL to initiate tasks up to $200,000 without prior approval from AMC and without an approved requirement document. Safeguards are inherent since AMC is immediately made aware of all LWL-initiated tasks. In practice, the Military Operations Division (MOD) of LWL, develops and informally coordinates with TRADOC, its agencies, and users in the field, a ROC-type document which serves as guidance to the development engineer. Coordination with other developing agencies is also effected to assure that no unnecessary duplication of effort exists. Full advantage is taken of all on-going related work. The internally generated document serves as the basis for a ROC and this is transmitted to TRADOC as soon as development has progressed far enough to indicate likely success. Automatic transmittal of all such documents, as was done at one time, has been discovered to be non-productive since it generates TRADOC action on many ideas which later do not materialize. This system seems to be working successfully. It permits the AMC to explore a variety of technologies and applications prior to initiation of formal documentation; at the same time it makes provision for the ROC when it is needed to guide engineering development.

b. In-house, user-developer relationship. LWL is organized with all of its military in one division representing the user, and the development engineers and scientists in two other divisions. In addition to providing user guidance through a ROC-type document, the qualified, experienced combat arms field grade officers and senior NCO's monitor the on-going tasks on an almost daily basis. This insures that the trade-offs between operational characteristics and technical feasibility are made as needed with no loss in time or resources. Once hardware is developed, MOD assumes a test role and assists the task engineer and the supporting analysts in assuring specified characteristics are being met, and they work together to overcome deficiencies.

c. Multidiscipline capabilities. LWL professional personnel are carefully selected to provide the Laboratory the wide variety of education, training, and experience needed to cope with problems which may be encountered in any field of military endeavor. This broad range of talent provides for either simultaneous alternative approaches employing different scientific principles, or the combination of several disciplines in one item. Initial brainstorming permits the management to select from a number of options in deciding how to meet a requirement. An organizaiton chart illustrates the multidisciplinary nature of the Laboratory, but not the specialties encompassed under the broad categories.

d. In-house shop and design capabilities. The Laboratory has its own facilities for design and fabrication of hardware, in addition to contractor support available through service contracts and R&D contracts. This enables rapid and close coordination between the engineer, the draftsman and the machinist or other artisan. Ideas can be quickly converted to hardware with due consideration of eventual production engineering and a technical data package can be prepared in the Laboratory.

e. Single line-item funding. The USALWL is funded as a single line-item in the AMC 6.3 Program and Budget. Given a specified sum of money at the beginning of each fiscal year, currently about 6 million dollars, the CO has the resources and the flexibility to respond immediately to any reasonable quick reaction requirement without administrative delay.

f. Small size. Despite the variety of talents described, LWL is a very small laboratory with a Table of Distribution of 16 military and 111 civilian personnel, located in two buildings at Aberdeen Proving Ground. Senior technical supervisors are collocated with the task engineers adjacent to small laboratories for each of the technical groupings. These characteristics lead to cross-fertilization of ideas, good coordination and an organization which can be readily managed. The Commander and Technical Director can be familiar with all the work going on and readily accessible for guidance and decisions whenever required.

4. Relationships with other agencies:

a. LWL relies on TRADOC and its subordinate agencies for informal comments concerning the possible requirement for a particular type of hardware and for whatever guidance can be furnished concerning characteristics. An official position on most LWL proposals would be "no requirement" since a requirement document has not yet been written and staffed; however, these unofficial comments are very helpful. For those items which show promise, LWL transmits its internally-generated requirement document to serve as a basis for TRADOC initiation of a ROC or other appropriate action. IPR's are scheduled to determine official positions. LWL coordinates with TRADOC and appropriate elements of AMC to determine the timing of these latter actions and assist in the technical portions of the ROC. The goal is to have an approved ROC coincident with a technical data package and adequate funding to continue development and production.

b. In addition, in accordance with a recent TRADOC-LWL agreement, LWL will assist the TRADOC program (formerly TECMAT) for purchase and test of commercial items.

c. LWL relationships within AMC are outlined briefly in a draft agreement under negotiation at the time of transfer. Briefly summarized, they provide that HQ, AMC will designate, on LWL request, a subordinate activity for an LWL development. LWL initiates coordination with that activity at an early stage to insure a smooth transition from the prototype to engineering development (if required), production engineering and entry into the Army materiel system. The process is intended to be similar to that followed in bringing an item developed in an AMC laboratory into the production element of a commodity command. The proposed agreement also coversd the problems in programming and budgeting area by having LWL estimate funds required to support follow-on development of LWL tasks. The ultimate goal is to provide an AMC activity with a technical data package, an approved ROC and necessary funding, all without administrative delay, to complete the rapid completion of the materiel acquisition cycle.

d. Aside from work on Army items, LWL does a certain amount of work for other government agencies on items which are an outgrowth of Army developments or which can result in ultimate Army benefits without the use of Army funds. Typical of these are tasks for the USMC and the USAF with the Army monitoring for possible later purchase of the item, civil disturbance and law enforcement tasks funded by the Law Enforcement Assistance Administration (LEAA) which may well have application for the military police or National Guard troops, and work for the Bureau of Narcotics and Dangerous Drugs which can be used by Army agencies in fighting the drug problem.

5. Evaluation of LWL items. LWL, in-house and with TECOM or contractor assistance, initially evaluates its own developments. Following that, user evaluations are usually arranged. If the development is in response to a particular problem being encountered in a field command, that command is given the first opportunity to evaluate the proposed solution. In the past, these were generally combat evaluations; now, evaluations by MASSTER or use in maneuvers in an operational environment must be substituted for actual combat. In any case, the objective is to determine the value of the item to the user under actual field conditions. Results are not expected to be precise and subjective judgements often enter into reports, but an evaluation is considered successful if it answers the question of burden vs. benefit and additionally provides some suggestions for design improvement. For the relatively inexpensive prototypes LWL develops it appers most cost-effective to detemine user interest before advancing to full scale development. LWL has, on occasion, been designated as the developing agency and carried an item through ET/ST, but it is considered a better use of resources to turn an item over to another AMC acitivity prior to ET/ST.

DEPARTMENT OF THE ARMY
U. S. Army Land Warfare Laboratory
Aberdeen Proving Ground, Maryland 21005

LWL Directive No. 26

25 February 1970

U. S. ARMY LAND WARFARE LABORATORY LIAISON OFFICER

I. REFERENCE:

A. OCRD Memorandum for: Commanding Officer, U. S. Army Limited War Laboratory, subject: Terms of Reference, Liaison Officer, Limited War Laboratory to Army Concept Team In Vietnam, dated 17 September 1965.

B. Paragraph 2k, Letter, CRDLWL-1, dated 7 July 1967, subject: Transmittal of Final Report of Mr. P. B. Ferrara.

II. PURPOSE:

The purpose of this directive is to prescribe policies, operating procedures and responsibilities of the LWL Liaison Officer prior to departure, during and after returning from Vietnam.

III. APPLICABILITY:

Instructions and guidance contained in this directive apply to all LWL personnel dealing with or assigned as LWL LO to Vietnam.

IV. CONTENTS:

This directive is presented in Sections which cover specific subject areas. The areas contained herein are as follows:

Section I - General
Section II - Actions and Duties Prior to Departure
Section III - Duties in Vietnam
Section IV - Duties After Return to LWL
Section V - Security
Section VI - Personal Affairs Check List

RUDOLPH A. AXELSON
Colonel, GS
Commanding

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This Directive supersedes LWL Directive No. 26, dated 1 November 1967.

SECTION I - GENERAL

1. PURPOSE: The purpose of the assignment of a Liaison Officer between the Land Warfare Laboratory (LWL) and the Army Concept Team in Vietnam (ACTIV) is to:

a. Serve as Liaison Officer for the Commanding Officer, LWL and not as a member of a branch or divi sion. Tasks of any branch will not be given priority over those of any other branch, except as directed by the CO, LWL.

b. Expedite the flow of information between the two agencies, to include:

(1) Answering technical questions posed by members of ACTIV and other US military and civilian agencies in the Republic of Vietnam.

(2) Obtaining information, as required by LWL, concerning operations which can be translated into useful development guidance.

(3) Monitoring ACTIV evaluations and projects, particularly those concerning LWL developed items, and relaying this information to LWL.

(4) Insuring that appropriate ACTIV, USARV and MACV and separate command personnel are fully briefed on current LWL projects.

(5) Transmitting to LWL new ideas, problem areas and operational needs as outlined or presented by Chief, R&D Division, ACTIV or his representatives and tactical field units that may provide such input.

(6) Through travel, to familiarize the civilian engineer and scientist with the combat environment in RVN for which material is being developed.

(7) Follow through by the most expeditious means on items coming in-country, i.e., from their initial location in the aerial ports to their proper destinations.

(8) Give instructions, training and demonstrations at locations where applicable with follow through actions as required.

2. TOUR OF DUTY:

a. Individuals assigned as LO will be placed on TDY orders for a period of approximately 90 days.

b. Tours of succeeding LO will overlap by a minimum of six days to allow for orientation and briefing by preceding LO.

d. Any exception to the above will be approved by the Commanding Officer, USALWL.

3. FUNDING: Travel and TDY expenses will be borne by LWL. Cost Center 871000 will be cited in all travel of LO.

4. OPERATION: The LWL LO will report to and operate under the administrative supervision of Chief, R&D Division, ACTIV.

5. CLOTHING:

a. Military personnel will wear the uniform at all times while on duty.

b. Civilian personnel in-country should dress according to prescribed local directives and army regulations.

c. Name tapes should be worn at all times when in uniform. U. S. Army tapes will be removed from any items of uniformed clothing worn by civilians. In lieu of these tapes, civilians will wear triangular patches as prescribed.

SECTION II - ACTIONS AND DUTIES PRIOR TO DEPARTURE

1. NOTIFICATION:

a. The Commanding Officer, U. S. Army Land Warfare Laboratory, will announce the selection of a replacement liaison officer approximately 60 days prior to the expiration of the tour of duty of the preceding LO. A tentative departure date will be announced simultaneously.

b. Upon notification, the newly selected LWL LO will notify the following headquarters, staff sections and/or individuals for support, coordination and guidance.

(1) Land Warfare Laboratory:

(a) Program and Operations Division, Chief, Administrative Services Branch and Chief, Logistics Services Branch.

(b) Division Chiefs (Arrange briefing schedule).

(c) Branch Chiefs (Arrange briefing schedule).

(d) Chief, TSD (Arrange check out of photographic supplies.)

(2) Director of Developments, OCRD (Military Operations Division will notify and coordinate Liaison visit).

(3) Kirk Army Hospital (Allergy Clinic).

2. DUTIES AND PURPOSE OF NOTIFICATION:

a. As soon as notification is made, it is important that the newly assigned LWL LO take immediate action to obtain a passport and visa (not required for military personnel). Detailed instructions for TDY Travel Outside Continental United States are contained in Section VII, LWL Directive No. 7, dated 18 June 1968.

(1) Officer concerned should report to the Kirk Army Hospital. Civilians should report to the Occupational Health Service, Building 305. Individuals should bring their shot records to determine what additional immunizations will be required prior to departure. If possible, all shots should be scheduled for completion prior to departure from APG. Shot

records will be checked at Travis AFB. Facilities for immunizations are available at Travis AFB; however, it is recommended that all immunizations be completed prior to departure from APG.

(2) Coordinate with Chief, Logistics Services Branch, LWL to receive an allowance of required clothing.

(3) The newly assigned LWL LO is required to make an orientation visit to Director of Developments, OCRD, Washington. As outlined in paragraph 1b(2), this section, MOD will arrange a time and date for the visit.

(4) LO will, enroute to Vietnam, make a liaison visit to Korea (HQ, 8th US Army) for a period not to exceed 5 days.

(5) LO will request orders and baggage allowance and make necessary reservations.

b. Upon receipt of orders, the newly assigned LO will notify the Chief, MOD of the contents and travel arrangements.

c. Following notification by the newly assigned LO, the Chief, MOD will advise the current LO in Vietnam of the date of arrival. If warranted, any variation in the standard six day in-country LO overlap will be announced in this communication. This information will permit the current LO to make arrangements for pick up and quarters for the incoming LO.

d. It is imperative that each LO be thoroughly familiar with all LWL projects prior to departure. Division Chief, Branch Chiefs and project engineers will make themselves available to brief the LO on respective projects. However, it is the responsibility of the LO to insure he has gathered sufficient information concerning each LWL project. After arrival in Vietnam, it is anticipated that each LO will be asked to furnish project information such as:

(1) Current projects of LWL.

(2) Purpose of the project.

(3) Description of the item and its function.

(4) Laboratory plans for operational evaluations to be conducted in RVN (numbers to be made available, dates, etc..)

e. LWL Task Sheets receive fairly wide distribution. They are an essential element of information for the LO and are used frequently in lieu of briefings and visits to inform outside agencies on specific aspects of the LWL program. For these reasons, it is desirable to have the task sheet unclassified and to limit the presentation to a single typewritten page per task. A complete description of the proposed device is required; therefore, more than one sheet may be required to adequately describe the item. To assist in attaining these objectives, all task sheets will be prepared in the format prescribed in Inclosures 1, 2 and 3, in two copies. The final task sheet will be submitted to MOD within 7 days after approval of a task and thirty days prior to departure of LO. MOD will arrange for necessary reproduction and distribution. The LO will be thoroughly familiar with the contents of the task sheets. Where only minor changes have occured since the last report, the LO will pen and ink change his copy until the next report becomes available.

(CLASSIFICATION)

LWL APG MD
Date

Task Number
NAME DESIGNATION

1. PROBLEM:
2. REQUIREMENT:
3. DESCRIPTION:
4. CHARACTERISTICS:
5. MILESTONES:
6. CURRENT STATUS:
7. SCHEDULE OF AVAILABILITY:
8. TASK OFFICER:

INSTRUCTIONS FOR COMPLETING LWL TASK SHEET

1. PROBLEM: State, in specific terms, the problem existing in the field which caused the requirement.

2. REQUIREMENT: State specifically the basis of the requirement (i.e., SDR, QMDO, QMR - draft or final and agency involved - GNI, ENSURE - number letter, any applicable changes and dates).

3. DESCRIPTION: A word picture of LWL's concept to meet the stated requirement.

4. CHARACTERISTICS: Include all known data or design characteristics that are pertinent to the LWL item (i.e., weight, ranges, design specification and compatibility with other equipment).

5. MILESTONES: Extracted from the Task Approval Sheet and stated in Fiscal Year Quarters.

6. CURRENT STATUS: Discuss briefly contractual awards, status of development, test results, numbers for testing and all pertinent information concerning present disposition of the task.

7. SCHEDULE OF AVAILABILITY: Forecast of date (FY Quarter) and number of units which will be available to support RVN evaluations; if no such requirement exists, state when a number could be made available if requested.

8. TASK OFFICER: Name and Branch of Task Officer.

(Example)

LWL APG MD
1 Oct 1967

03-P-63
POSITION LOCATOR

1. PROBLEM: A compact, independently operated, lightweight man-portable position indicating device is required to provide US Forces operating in any type terrain a means of locating their geographic position at all times.

2. REQUIREMENT:

a. CDOG, Paragraph 1312 (B) (c).

b. Draft Proposed SDR, dated 6 October 1964.

c. PROVOST

d. ENSURE No. 109.

e. MACV Message, dated 14 May 1966.

3. DESCRIPTION: The Position Locator System consists of two basic units; a computer/compass and a display/control unit which together weighs a total of ten pounds. The system is powered by a battery BA-63 which will provide 40 hours of continuous operation. The display/control unit has an eight-place UTM grid map coordinate digital readout indicator and is lighted with internal Beta lights.

4. CHARACTERISTICS: When operated by an individual with only eight hours of training on level or gently rolling terrain, the Position Locator is accurate to within two percent of total distance traveled and when utilized on difficult or steep terrain to within five percent of total distant covered. Errors can be corrected by the operator when reaching a known coordinate point on the ground by updating the coordinate digital readout indicator. The system is 100 percent compatible with all standard military maps and photomaps. The system is not susceptible to any known counter-measures; however, magnetic differences in certain parts of the earth may lead to greater errors than those listed above. It does not interfere with normal operator activity, has a parachute delivery capability, is not detectable during the hours of darkness beyond three meters and will not affect the operator's night vision.

5. MILESTONES:

a. Resubmit modified Position Locators to ACTIV - 1st Qtr, FY 68.

b. Monitor ACTIV evaluation and submit LWL Final Report - 2d Qtr, FY 68.

6. CURRENT STATUS: Four units returned to RVN for operational evaluation on 15 September 1967.

7. SCHEDULE OF AVAILABILITY: Production lead time for 50 to 100 units is 9 - 12 months after contract award.

8. TASK OFFICER: T. Welch, Applied Physics Branch

SECTION III - DUTIES IN VIETNAM

1. ADMINISTRATION. The outgoing LWL LO with the assistance of ACTIV, will coordinate in-processing, meet the incoming LO on arrival and arrange quarters.

2. BRIEFING. The outgoing LO will insure that his replacement is briefed on the situation, current operating procedures, and the status of in-country LWL developed items. Additionally, prior to departure, he will assist the replacement LO in becoming familiar with key personnel of ACTIV, MACV, USARV, separate commands and other individuals or staff sections involved with and/or interested in LWL projects.

3. REPORTS, CORRESPONDENCE AND INFORMATION. The LWL Liaison Officer, during his 3-month tour of duty, will submit the following projects:

a. Weekly memorandums - Liaison Officers will submit a minimum of one memorandum weekly. These memos will contain information concerning answers to questions posed by LWL personnel, status of in-country LWL items or transmittal of ideas and problem areas from field forces. All correspondence (memorandums) pertaining to official business will be addressed to the Commanding Officer, U. S. Army Land Warfare Laboratory. (Sample attached as Inclosure 1.)

b. All official correspondence originating from LWL to the LO in Vietnam will be sent to MOD for dispatch in four copies. The correspondence received from the Divisions and Branches will be transmitted to Vietnam a minimum of once each week. The Chief, MOD will brief the Commanding Officer on the contents of the correspondence prior to dispatch. (Note: All correspondence, except that which is purely personal in nature is official.)

c. Photographs will be taken during field trips when possible. The Laboratory needs pictures of villages, towns, roads, jungles, rice paddies, tunnels, VC installations, etc.. A camera and an inexhaustible supply of film are available for this purpose. The films can either be developed in Vietnam or sent back to LWL. Area location should accompany the pictures.

4. PERSONAL INFORMATION FOR REPLACEMENT LIAISON OFFICER. Approximately 30 days prior to departure from Vietnam, the LWL LO will write a letter to his replacement furnishing the following personal information:

a. Personal financial procedures and recommendations.

b. Currency regulations.

c. Check cashing facilities.

d. Billeting (payments and arrangements).

e. Meal costs.

f. PX facilities.

g. Clothing requirements.

h. Transportation.

5. DEPARTURE. Upon receipt of notification of the date of arrival of replacement, the LO in Vietnam should immediately coordinate with Tri-Service ATCO to obtain booking on a specific flight. Departure date will be approximately 6 days after the date of arrival of the replacement LO.

Liaison Officer's Weekly Progress Report #1

6 October 1969 - 12 October 1969

1. Items Received.

   a.
   b. (Identify documents and indicate disposition).
   c.

2. Discussions and Briefings.

   a.
   b. (List unit, jcb title, and name).
   c.

3. General.

   a.
   b. (Cover information not directly related to status of
   c. an LWL task).

4. Project Status.

   a.
   b. (Cover weekly every LWL task currently being
   c. evaluated and action taken on tasks due in-country.)

5. Problem Areas.

   a.
   b. (Fully describe the problem).
   c.

6. LWL Requested Information.

   a.
   b. (Refer to individual and information requested).
   c.

7. Observations on LWL/ACTIV/USARV, G3, DS&T/Relationships.

a.
b. (Cover as they occur or come up.)
c.

(NOTE: Classify each paragraph as appropriate.)

Incl
(List all inclosures
by number and title)

Name
Rank
USALWL LO

SECTION IV - DUTIES AFTER RETURN TO USALWL

1. After Action Report. Liaison Officers will submit to the Commanding Officer, USALWL, within 15 working days following his return to LWL, 5 copies of an After Action Report which will summarize the highlight activities of his tour, plus appropriate recommendations. Information copies will be furnished to Chief, ACTIV and Chief, Director of Developments, OCRD, by the CO, USALWL. (Sample copy of Acter Action Report attached as Inclosure 1). Returning Liaison Officer will insure that all property drawn from the Property Officer and TSD for his mission is turned into the issuing agency within 30 days after his return to CONUS.

2. Briefings. LO will be prepared to present a formal or informal briefing within 15 working days following his return to LWL.

(Sample Outline of After Action Reports)

Date

MEMORANDUM FOR COMMANDING OFFICER, USALWL

SUBJECT: LWL Liaison Officer After Action Report

1. Reference: LWL Directive Number 26, subject: U. S. Army Land Warfare Laboratory Liaison Officer, dated 25 February 1970.

2. In accordance with the provisions of the above reference, an After Action Report for the period day, month, to day, month is herewith submitted.

3. The following paragraphs will include:

a. Resume of significant activities. This will be, in general terms, a synopsis of the activities previously included in the weekly reports.

b. Requirements (ENSURE) initiated during the LO's tenure.

c. Status of in-country LWL developed items.

d. Changes in operating procedures of the LWL LO.

4. General Observations.

5. Recommendations.

Signature Block

SECTION V - SECURITY

1. The LWL LO will read the below listed references:

   a. AR 380-5.

   b. AR 380-6.

   c. OCRDR 380-3.

   d. Section III and IV of LWL Directive No. 7, Administration.

2. Particular attention should be given to correspondence and telephone calls passed between LWL and LWL LO for proper security classification. Information gathered in Vietnam must be closely screened by the LWL LO for proper security classification prior to dispatch or telecon.

3. Security conditions in the Republic of Vietnam require particular and constant attention to the physical security of classified documents and information. Familiarity with above listed references is an individual responsibility.

SECTION VI - PERSONAL AFFAIRS CHECKLIST

1. Recommended checklist for LWL LO prior to departure to Vietnam. Military personnel are expected to process through military personnel channels so actions peculiar to the military have been purposely omitted.

a. Laboratory affairs:

(1) Travel orders and plans completed.

(2) Staff sections/individuals notified.

(3) Passport/Visa if required.

(4) Pre-departure division/branch briefings.

(5) Organizational clothing, equipment and material.

b. Fiscal affairs:

(1) Allotments.

(2) Joint checking and savings accounts.

(3) Debts and obligations.

(4) Safety deposit boxes; access thereto.

c. Legal affairs:

(1) Power of Attorney.

(2) Will.

(3) Other legal assistance as required.

d. Insurance:

(1) Beneficiaries.

(2) Adequate coverage for Vietnam.

(3) Insurance other than life, i.e., auto, home, etc..

e. Medical:

(1) Immunization.

(2) Medical and dental appointments. (Facilities not always available in RVN.)

(3) Special medications if required.

(4) Glasses.

f. Record of Emergency Data or Equivalent.

g. Dependents briefings:

(1) Discuss and inventory personal affairs (suggested format attached as Incl 1. Information should be collected and left with next of kin).

(2) Location of emergency assistance if required.

(3) Mailing address.

(4) Income Tax - (if absent during period of filing income tax, arrangements should be made for this contingency).

2. A major contribution to high morale and hence therefore, to increased effectiveness, is the knowledge that one's personal affairs are in good order. It is incumbent on each individual to accomplish those actions required prior to departure to Vietnam.

APPENDIX A

PERSONAL AFFAIRS CHECKLIST

1. PERSONAL AND FAMILY DATA

a. NAME (First, middle, last)	b. DATE OF BIRTH (Day, month, year)	c. PLACE OF BIRTH (City & State)

d. RETIRED GRADE	e. SERVICE NUMBER	f. VA CLAIM NUMBER (If applicable)

g. MOTHER'S FULL NAME	h. FATHER'S FULL NAME	i. WIFE'S OR HUSBAND'S FULL NAME

j. LIST FULL NAME AND DATE OF BIRTH OF EACH OF YOUR CHILDREN

NAME OF CHILD	DATE OF BIRTH	NAME OF CHILD	DATE OF BIRTH

k. INDICATE NAME AND ADDRESS OF INDIVIDUAL WHO MAY BE CONSULTED IN REGARD TO YOUR BUSINESS OR PERSONAL AFFAIRS

NAME (First, Middle, Last)	ADDRESS (Street, City, & State)

l. LOCATION OF MARRIAGE CERTIFICATE (*This certificate will be necessary in order to establish claim for arrears in pay, gratuity payment, pensions and Social Security benefits.*)

m. LOCATION OF CITIZENSHIP PAPERS, IF NOT BORN IN THE UNITED STATES

n. LIST EACH MEMBER OF YOUR FAMILY, INCLUDING YOURSELF, INDICATING LOCATION OF THEIR BIRTH CERTIFICATES OR OTHER PROOF OF DATE OF BIRTH (*Generally required by Insurance Companies & Social Security Board*)

MEMBER OF FAMILY	LOCATION OF BIRTH CERTIFICATE OR OTHER PROOF OF BIRTH

o. LOCATION OF DIVORCE PAPERS OR CERTIFIED COPIES THEREOF, IF EITHER SPOUSE HAS BEEN DIVORCED

2. RETIRED PAY

p. PAYABLE BY	q. ADDRESS OF PAYER
☐ ARMY FINANCE ☐ VETERANS ADMINISTRATION	

r. INDICATE IF ELECTION MADE UNDER RETIRED SERVICEMAN'S FAMILY PROTECTION PLAN

☐ YES ☐ NO

3. WILLS

Every retired member should make a will. Legal counsel should be obtained for this purpose in order to have the will conform with state law covering the disposition of estates. At most Army posts, a Legal Assistance Officer is available to provide advice in this matter.

a. (Check one) ☐ I HAVE A WILL ☐ I HAVE NOT A WILL	b. IF "YES" INDICATE LOCATION
c. NAME OF LAWYER	ADDRESS OF LAWYER
d. NAME OF EXECUTOR	ADDRESS OF EXECUTOR

4. LIFE INSURANCE

a. (Check one) ☐ I HAVE ☐ I HAVE NOT

b. TYPE (Check one) ☐ GOVT ☐ COMMERCIAL ☐ BOTH

INSURANCE COMPANY	POLICY NUMBER	AMOUNT

c. PAYABLE BY LUMP SUM ☐ INSTALLMENTS FOR A NUMBER OF YEARS ☐

d. LOCATION OF THE POLICIES

e. INDICATE IF THERE ARE ANY UNPAID LOANS

f. LOCATION OF LOAN PAYMENT RECEIPTS

g. LOCATION OF THE PREMIUM RECEIPTS

5. CASH IN BANK

a. CHECKING ACCOUNT (Check one) ☐ YES ☐ NO	(1) IF "YES", NAME OF BANK	(2) ADDRESS OF BANK
(3) APPROXIMATE AMOUNT	(4) TO WHOM PAYABLE (Show names of both owners, if joint account)	
b. SAVINGS ACCOUNT (Check one) ☐ YES ☐ NO	(1) IF "YES", NAME OF BANK	(2) ADDRESS OF BANK
(3) APPROXIMATE AMOUNT	(4) TO WHOM PAYABLE (Consideration should be given the fact that bank accounts are not immediately available to widow or other dependent unless said dependent is a joint owner of the account)	

6. UNITED STATES WAR OR SAVINGS BONDS

a. OWNER OF BONDS (Check) ☐ YES ☐ NO	(1) IF OWNER OF BONDS, INDICATE LOCATION

b. INDICATE PERSON DESIGNATED AS CO-OWNER OR BENEFICIARY (Check one person and one co-owner or beneficiary)

☐ WIFE OR HUSBAND ☐ CO-OWNER

☐ OTHER DEPENDENT ☐ BENEFICIARY

e. RECORD OF BAR AND SAVINGS BONDS BY SERIAL NUMBER AND DENOMINATION *(Check one)* ☐ I HAVE A RECORD ☐ I HAVE NO RECORD	IF OWNER OF RECORD, INDICATE ITS LOCATION *(This information is necessary to replace lost bonds)*

7. STOCKS AND BONDS

a. OWNER OF STOCKS AND BONDS *(Check one)* ☐ YES ☐ NO	b. IF "YES", GIVE LOCATION
c. NAME OF FINANCIAL ADVISOR	ADDRESS OF FINANCIAL ADVISOR

8. SOCIAL SECURITY

a. PAYER OF SOCIAL SECURITY TAX *(Check one)* ☐ YES ☐ NO	b. SOCIAL SECURITY NUMBER	c. LOCATION OF SS CARD OR STUB
d. RECORD OF UP-TO-DATE EMPLOYMENT HISTORY SHOWING PLACE AND TYPE OF WORK IN EACH CASE, TO INCLUDE EMPLOYMENT PRIOR TO ARMY SERVICE *(Check one)* ☐ I HAVE A RECORD ☐ I HAVE NO RECORD		LOCATION OF RECORD

e. PAYMENT OF RETIREMENT OR SURVIVOR'S BENEFITS BY SOCIAL SECURITY ADMIN IS NOT AUTO TIC. CLAIMS SHOULD BE FILED IMMEDIATELY WITH NEAREST OFFICE OF SOCIAL SECURITY ADMIN.

LOCATION OF NEAREST OFFICE OF SOCIAL SECURITY ADMIN *(For further information, contact local Veterans' Administration Office.)*

9. REAL ESTATE

a. OWNER *(Check one)* ☐ YES ☐ NO	b. INDICATE IF TITLE IN YOUR NAME ☐ YES ☐ NO	c. INDICATE IF TITLE IS INSURED ☐ YES ☐ NO
d. IF INSURED, NAME OF COMPANY	ADDRESS OF COMPANY	
e. LOCATION OF TITLE INSURANCE POLICY	f. MORTGAGE ON PROPERTY *(Check one)* ☐ YES ☐ NO	
(1) NAME OF HOLDER OF MORTGAGE	(2) ADDRESS OF HOLDER OF MORTGAGE	
(b) LOCATION OF COPY OF MORTGAGE	(c) INDICATE IF MORTGAGE PAID IN PART *(Check one)* ☐ YES ☐ NO	
(d) LOCATION OF RECEIPTS	g. LOCATION OF REAL ESTATE TAX RECEIPTS	

h. PROPERTY INSURED *(Check one)* ☐ YES ☐ NO	(1) COMPANY INSURED WITH	(2) LOCATION OF POLICIES
i. OWNER OF CEMETERY PLOT *(Check one)* ☐ YES ☐ NO	(1) LOCATION OF PLOT	(2) LOCATION OF DEED TO PLOT

j. INDICATE IF BURIAL IS DESIRED IN A NATIONAL CEMETERY *(Check one)* ☐ YES ☐ NO

10. PERSONAL PROPERTY

a. OWNER OF PERSONAL PROPERTY SUCH AS HOUSEHOLD GOODS, BOATS, MACHINERY, LIVESTOCK, GOODS IN STORAGE, ETC. *(Check one)* ☐ YES ☐ NO *(If "Yes", list items)* *(Attach list if extra space is needed)*

(1) ITEMS INSURED *(Check one)* ☐ YES ☐ NO	(2) LOCATION OF POLICIES AND INVENTORY LISTS

(b) LOCATION OF ANY PAPERS TO PROVE OWNERSHIP OF, OR RELATING TO LOANS AGAINST, SUCH ARTICLES

a AUTOMOBILE OWNER (Check one) ☐ YES ☐ NO	(1) DESCRIPTION			
	MAKE		MODEL	
	YEAR	ENGINE NUMBER		SERIAL NUMBER
(2) TITLE NUMBER AND DATE	(3) STATE IN WHICH TITLE ISSUED	(4) LOCATION OF TITLE		(5) STATE IN WHICH AUTOMOBILE LICENSED
(6) AUTOMOBILE FINANCED (Check one) ☐ YES ☐ NO	IF "YES", INDICATE BY WHOM		LOCATION OF RECEIPTS	
(7) AUTOMOBILE INSURANCE (Check one) ☐ YES ☐ NO	IF "YES" INDICATE BY WHOM		ADDRESS	
(8) LOCATION OF BILL OF SALE AND INSURANCE POLICY FOR THE AUTOMOBILE				
c SAFETY DEPOSIT BOX (Check one) ☐ I HAVE ☐ I HAVE NOT	(1) IF "YES", GIVE LOCATION OF BOX		(2) LOCATION OF KEY TO BOX	
(3) INDICATE IF BOX IS JOINTLY HELD (Check one) ☐ YES ☐ NO	IF "YES", GIVE NAME OF JOINT OWNER			

11. MISCELLANEOUS

a INDICATE IF POWER OF ATTORNEY HAS EVER BEEN GIVEN TO ANYONE (Check one) ☐ YES ☐ NO	IF "YES", NAME OF INDIVIDUAL
b LIST BELOW THE NAMES AND ADDRESSES OF PERSONAL CREDITORS OR DEBTORS	

c LOCATION OF YOUR COPIES OF NOTES OR EVIDENCE OF PAYMENT OF LOANS	d LOCATION OF YOUR FEDERAL AND STATE INCOME TAX RECORDS AND RELATED PAPERS	e LOCATION OF OTHER TAX RECORDS
f INSERT BELOW ANY OTHER DATA IN ADDITION TO INFORMATION FILLED IN WHICH WOULD BE OF USE TO YOUR DEPENDENTS		

U. S. ARMY
LAND WARFARE LABORATORY
ABERDEEN PROVING GROUND, MARYLAND

LWL DIRECTIVE
NO. 9

8 February 1972

UNSOLICITED PROPOSALS

I. PURPOSE

To establish procedures and responsibilities related to the processing of unsolicited proposals (including formal and informal suggestions) received by the US Army Land Warfare Laboratory.

II. APPLICABILITY

This directive is applicable to all LWL personnel who are responsible for handling or reviewing unsolicited proposals.

III. SCOPE

This directive covers the specific procedures to be used in processing unsolicited proposals and describes the responsibilities of technical and staff members concerned with such proposals, technical suggestions through formal Government channels, and letters from private citizens offering unsolicited technical suggestions. Also included in this directive are definitions of appropriate terms, a sample routing slip (comment sheet), a flow-chart showing typical routing of unsolicited proposals, and sample letters of reply.

IV. CONTENTS

RICHARD L. CLARKSON
Colonel, GS
Commanding

This directive supersedes LWL Directive No. 9, dated 31 August 1968.

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1. GENERAL

This directive provides specific instructions for the processing of unsolicited proposals and formal or informal suggestions received by LWL. The procedures described are intended to provide an efficient and expeditious means of handling such documents. The responsibilities of technical and staff members concerned with the handling and review of these documents are described in detail.

2. DEFINITIONS

a. Unsolicited Proposal - any technical proposal for research and development or any technical suggestion, formal or informal, presenting an idea or plan for new materiel or improvement of existing materiel and/or its use, which is received on an unsolicited basis. Such "proposals" may be of widely varying format and may be submitted by industrial firms, educational institutions, other Government agencies, private individuals, or other sources. Proposals received as a result of the announcement of possible problem areas in a so-called "Problems Guide" shall also be considered as unsolicited. (Proposals received as a result of a formal solicitation, e.g., through RFP or RFQ, are not included under this directive.)

b. Routing Slip (Comment Sheet) - LWL internal form attached to an unsolicited proposal (sample at Inclosure 1) which indicates specific routing, responsibilities, suspense dates, and desired actions with regard to the proposal. Comments of various reviewing groups are entered on this slip (or on an attached sheet, if comments are lengthy) with initials and dates.

c. Letter of Acknowledgment - letter (sample at Inclosure 2), usually dispatched within two days after receipt of an unsolicited proposal, which informs the sender that his proposal has been received and is currently being reviewed. A letter of acknowledgment will not always be required as, for example, when an immediate answer can be given to the submitter of the proposal.

d. Final Reply - letter prepared after an unsolicited proposal has been completely processed through the Laboratory (normally about one month after receipt of the proposal) to inform the sender of the results of the Laboratory's review of his proposal. A sample final reply is inclosed (Inclosure 3).

e. Interim Reply - courtesy letter dispatched to the submitter when there is an unusual or undue delay in forwarding a final reply to his unsolicited proposal. This letter, which is staffed in the same manner as a final reply, gives reason(s) for the delay and indicates, if possible, when a final reply can be reasonably expected. A sample interim reply is inclosed (Inclosure 4).

f. Action Division (ACT DIV) - LWL Division with primary responsibility for recommending a Laboratory course of action on a given unsolicited proposal.

g. Action Branch (ACT BR) - LWL Branch with primary responsibility for detailed technical review of a given unsolicited proposal.

3. RESPONSIBILITIES

a. General - It is the responsibility of each individual to whom this directive applies to insure that all unsolicited proposals are treated in accordance with the instructions stated herein. This includes:

(1) Immediately forwarding an unsolicited proposal received directly from the suggester to Research Analysis Office (RAO) for initiation of proper LWL processing.

(2) Monitoring unsolicited proposals closely and executing responsibilities relating to them as expeditiously as possible to meet assigned suspense dates and, when impossible to do so, informing RAO of the reason(s).

(3) Entering comments on the unsolicited proposal routing slip or attaching a separate comment page as appropriate, initialing and dating the comments, and forwarding the proposal to the next addressee on the routing slip.

b. Research Analysis Office is responsible for:

(1) Receving all incoming unsolicited proposals.

(2) Managing the records of all unsolicited proposals, including the establishment and maintenance of an identification system, and recording pertinent information on each proposal.

(3) Over-all administrative processing of unsolicited proposals.

(4) Preparing the letter of acknowledgment on unsolicited proposals for the signature of Chief, RAO, and mailing to the submitter.

(5) Preparing unsolicited proposal routing slips, to include suggested ACT DIV, ACT BR, and suspense dates together with other pertinent information.

(6) Reviewing unsolicited proposals and providing RAO comments.

(7) Preparing, signing and routing all interim and final replies to unsolicited proposals.

(8) Mailing all correspondence relative to proposals.

c. The Military Operations Division (MOD) is responsible for:

(1) Reviewing unsolicited proposals from the user's standpoint.

(2) Providing appropriate comments as to whether a formally-stated requirement or military need for a proposed item exists and as to the potential field worthiness or desirability of the item.

(3) Review by Materiel Readiness Branch (MRB) of interim and final replies to unsolici d proposals received from other Government agencies.

d. The Action Branch is responsible for:

(1) Reviewing assigned unsolicited proposals and attached comments.

(2) Providing comments on unsolicited proposals in sufficient detail to serve as the primary basis for an interim or final reply.

(3) Coordinating with other Branches, Divisions or Offices reviewing an unsolicited proposal to resolve any differences of opinion regarding the proposal.

(4) Reviewing interim and final replies to unsolicited proposals.

e. The Action Division is responsible for:

(1) Reviewing the proposals and attached comments of those unsolicited proposals assigned to the Branches in the Division.

(2) Providing own comments, including a recommended course of action on applicable proposals.

(3) Reviewing interim and final replies to proposals for compliance with directions, completeness, soundness of decisions, etc.

f. The Technical Director (TD) is responsible for:

(1) Reviewing unsolicited proposals and all attached comments.

(2) Approving recommended course of action or directing different final disposition for subject proposals.

4. PROCEDURES

a. General

(1) A routing slip bearing appropriate identifying and other pertinent information will accompany all unsolicited proposals scheduled for Laboratory review.

(2) Routing will be accomplished generally as indicated in the inclosed flowchart (Inclosure 5).

b. Specific

(1) On receipt at the Laboratory, ALL unsolicited proposals, regardless of their specific addressees, will be sent immediately to RAO for initial processing prior to Laboratory review and action.

(2) After recording all necessary information concerning the proposal, RAO will perform a cursory evaluation, based on available information, to determine the need for further Laboratory review.

(a) If no further review is felt to be required, RAO will prepare a final or interim reply, for signature of Chief, RAO, and dispatch to the sender.

(b) If the proposal is thought to merit further consideration, a letter of acknowledgment, signed by Chief, RAO, will be dispatched to the suggester.

(c) For these latter proposals, a proposal package (including the proposal and any background or other pertinent information) will be forwarded to MOD.

(3) MOD will review the proposal package together with any other relevant information, from a user point-of-view, attach appropriate comments and return the package to RAO.

(4) RAO will review the proposal package, including MOD comments, and forward the package along with RAO's own comments to ACT BR.

(5) ACT BR will perform a detailed review of the proposal package and added comments and forward the package, including ACT BR comments, to ACT DIV.

(6) Chief, ACT DIV will review the proposal package (including all comments), attach his own comments and recommended course of action, and forward the proposal package to TD.

(7) TD will review the proposal package, provide his own comments (approving recommended action, directing alternate course of action, or resolving inter-Divisional differences), and forward the proposal package to RAO for preparation of final or interim reply.

(8) RAO will prepare reply for signature of Chief, RAO and forward it, together with complete proposal package, to ACT BR. (If reply is in answer to a proposal received from another Government agency, the package will be routed through MOD/MRB for review prior to forwarding to ACT BR.)

(9) ACT BR will review reply, initial and date RAO copy if satisfied with reply, and forward the proposal package to Chief, ACT DIV.

(10) Chief, ACT DIV will review reply, initial and date RAO copy if satisfied with reply, and forward the proposal package to TD.

(11) TD will review reply, initial and date RAO copy if satisfied with reply, and return the proposal package to RAO.

(12) RAO will mail reply to the suggester, distribute copies of reply as appropriate, and file remaining proposal package (including RAO copy of reply) for future reference.

S A M P L E

No. 1465
Date Rec'd by RAO 8 Feb 72

UNSOLICITED PROPOSAL COMMENT SHEET

UNSOLICITED PROPOSAL: "ABC System"

SUBMITTER: A B Corporation, Anywhere, USA

DATE OF LETTER OF ACKNOWLEDGMENT: 8 February 1972

SUSPENSE DATE FOR FINAL REPLY: 9 March 1972

REVIEW GROUPS	COMMENTS: [Reviewers should use reverse side or attach additional sheet(s) as required]
MOD Susp 11 Feb 72 Init _____ Date _____	
RAO Susp 17 Feb 72 Init _____ Date _____	
ACT BR: _____ Susp 23 Feb 72 Init _____ Date _____	
ACT DIV: _____ Susp 28 Feb 72 Init _____ Date _____	
TD Susp 2 Mar 72 Init _____ Date _____	

Incl 1

S A M P L E

LETTER OF ACKNOWLEDGMENT

RDLW-RAO

8 February 1972

A B Corporation
Anywhere, U. S. A.

Dear Sir:

Your unsolicited proposal No. 123 entitled "ABC System," submitted by your letter of 2 February 1972, has been received at the US Army Land Warfare Laboratory.

Your interest in submitting this proposal for our review is appreciated. It is now being circulated among appropriate Laboratory technical and operational personnel to determine its potential applicability to our current program. Upon completion of this review, you will be informed of any interest we may have in pursuing the proposed effort.

Please understand that consideration of your proposal does not imply financial or contractual support by this Laboratory.

Sincerely,

Chief, Research Analysis Office

Incl 2

SAMPLE

FINAL REPLY

RDLW-RAO 6 March 1972

A B Corporation
Anywhere, U. S. A.

Dear Sir:

The US Army Land Warfare Laboratory s in-house investigation pertaining to the subject of your unsolicited proposal No. 123, "ABC System," has been completed. As a result of this study, we are convinced that present state-of-the-art in the area of your concept is not sufficiently advanced to permit the development of an operational item having the low weight and size and high reliability required for application of the idea at this time.

We plan, however, to retain your proposal on file as an indication of your interest and competence in this area. Should future developments occur affecting our decision on your proposal, we shall contact you.

Thank you for your interest in submitting this proposal for our review. Please understand, however, that our consideration of your proposal does not imply financial or contractual support by this Laboratory.

Sincerely,

Chief, Research Analysis Office

Incl 3

S A M P L E

INTERIM REPLY

RDLW-RAO 6 March 1972

A B Corporation
Anywhere, U. S. A.

Dear Sir:

Your unsolicited proposal No. 123, "ABC System," has been thoroughly reviewed by appropriate technical and operational personnel of the US Army Land Warfare Laboratory. Although your proposed concept is believed to have merit, we must reserve our decision on the proposal until the results of an in-house investigation of a similar concept are known.

We are, therefore, taking no action on your proposal at this time but are retaining it in our files for possible future reference. In the event the results of our in-house study prove favorable to your firm, you will be notified immediately.

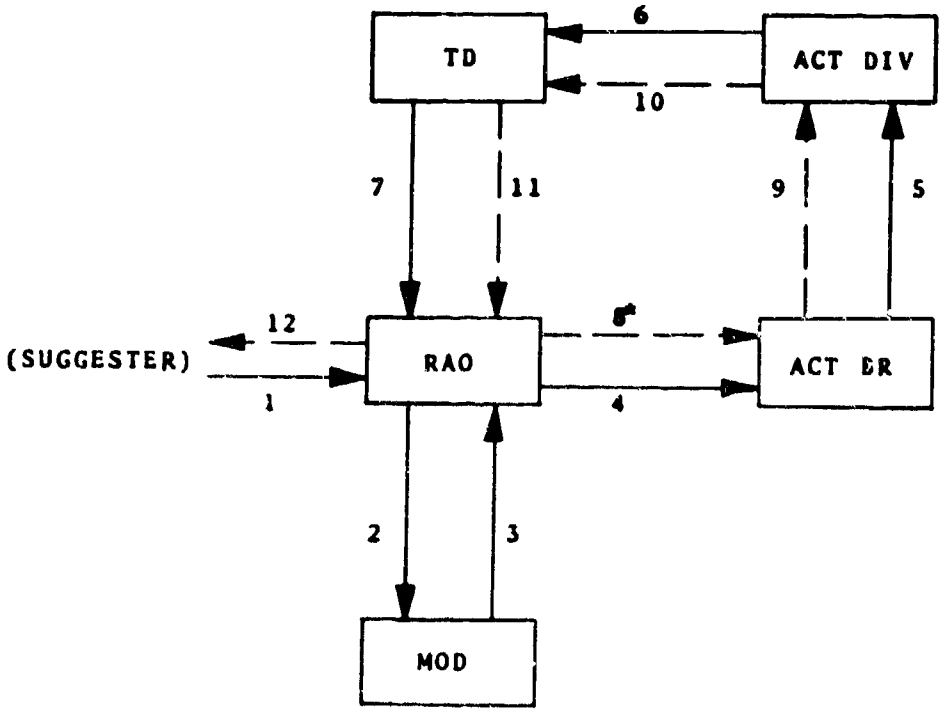
Your continued interest in our program is greatly appreciated. Please understand, however, that any further consideration of your proposal does not imply financial or contractual support by this Laboratory.

Sincerely,

Chief, Research Analysis Office

Incl 4

TYPICAL ROUTING OF UNSOLICITED PROPOSALS AT USALWL



*NOTE: Replies to proposals received from other Government agencies will be routed through MOD/MRB prior to forwarding to ACT BR.

Legend:
Proposal ———
Reply - - - -

Incl 5

GENERATION OF NEW IDEAS PROGRAM (GNI)

FISCAL YEAR 1963

Munitions Br.

TITLE

Studies & Investigations (Lightweight Truck Armor)
Investigation of Aircraft Signalling Kit
Studies and Investigations (Study of Recoil Pads for Small Arms)

Environment & Survival Br.

Tunnel and Cache Location System

Biological Sciences Br.

SF Water Filter Device
Enhancement of Human A ity
Dipole Detectors
Expedient Management of Abdominal Wounds
Fermentation Studies

FISCAL YEAR 1964

Communications/Electronics Br.

TASK NUMBER	TITLE
01-A-64	Telephone Amplifier
02-A-64	Noise Reduction Systems
03-A-64	Automatic Antenna Tuner
04-A-64	Base Antenna for Tactical Radios

Munitions Br.

01-A-64	Smoke Screen Troop Landing
02-A-64	Machine Gun Pintle Evaluation
03-A-64	Clip Loaded Automatic Weapon, Shotgun
04-A-64	Hand Grenade Float

Mobility Br.

01-A-64	Investigate Fiberglass Pontoons
02-A-64	Combination Power Supply Boost & Gyro Stabilizer
03-A-64	Noise Reduction of Two Cycle Engine
04-A-64	Ultra Lightweight Engine Generator, 25 to 50 Watt

Environment/Survival Br.

01-A-64	Vortex Machine
02-A-64	LW Collapsible Personnel Material Carrier
03-A-64	Further Reduction of Wt, Packet Subsistance Long Range
04-A-64	Pistol Crossbow
05-A-64	Mob Control Study
06-A-64	Electric Fence for Area Protection

Applied Chemistry Br.

01-A-64	Chemiluminescent Reactions
02-A-64	Method, Rice Destruction
03-A-64	Illuminator, Anti-Ambush High Intensity
04-A-64	Evaluation of Light Sources for Marking Identification
05-A-64	Multi-Source Ground Source Smoke Generator
06-A-64	Impairing or Destroying the Usefulness of Weapons Captured by the Enemy
07-A-64	Flexible High Temperature Materials

Applied Physics Br.

01-A-64	Electronic Counter Measures
02-A-64	Portable Lightweight Doppler Radar
03-A-64	Muzzle Flash Detector
04-A-64	Diode Light Sources
05-A-64	Battery Charger and Condition Indicator

06-A-64 Improved Transmitter Efficiency
07-A-64 Railroad Protection & Surveillance
08-A-64 High Energy Sound

Biological Sciences Br.

01-A-64 Animal Guidance Study
02-A-64 Anti-Personnel Effectiveness Frangible Incendiary Devices
03-A-64 Sabotage Methods for Insurgency and Counterinsurgency
04-A-64 Metallic Detectors
05-A-64 Smoke Generator
06-A-64 New Incendiary Agents
07-A-64 Submerged Still
08-A-64 Inhibition of Fermentation
10-A-64 Silent All-Purpose Launching Devices
09-A-64 Spring-loaded Impactor
11-A-64 Materiel Degradation
12-A-64 Photographic Surv.

FISCAL YEAR 1965

Communications/Electronics Br.

01-A-65 Electrical Clearing of Canals
02-A-65 Site Marker Antenna

Munitions Br.

01-A-65 Smoke Marker Dispenser
02-A-65 Parachute Descent Simulator Feasibility Study
03-A-65 Evaluation of Improved Transparent Armor

Mobility Br.

01-A-65 Selection of Vehicle for Delta Mobility
02-A-65 Feasibility Study of a Ducted Fan Antenna Support
03-A-65 Feasibility of Self Propulsion for Rolling Ammo Carrier
04-A-65 Performance Characteristics of Commercially Available Swamp Boat
05-A-65 Power Boost for Man Propelled Load Carrier
06-A-65 All Terrain Cycle - 2 Man Personnel Carrier
07-A-65 Small Fuel and Cargo Carrier
08-A-65 Development for 300 Gallon Capacity Land Mobile, Self-Powered Rolling Liquid Transporter - Aircraft Refueling System
09-A-65 Electro-Mechanical Drive Wheel for Load Carrier

Environment/Survival Br.

01-A-65 Personnel Detection in Water by Use of Electricity

Applied Chemistry Br.

01-A-65 String Actuated Devices

02-A-65 Hand Launched Target Marker

Applied Physics Br.

01-A-65 Expendable PSYWAR Voice Dissemination Media
02-A-65 Flicker Effects Weapons
03-A-65 Time - Degradation Devices
04-A-65 Feasibility Study of Ambush Detection by IR Backscatter from Human Effluents

Biological Sciences Br.

01-A-65 Pharmacological Enhancement of Sensory Perception
02-A-65 Life Science Documentation
03-A-65 Ultra-Lightweight Preventative Medicine Survey Kit
04-A-65 Conversion of Sewerage to Power
05-A-65 Portable Surgical Lamp
06-A-65 Flame Thrower as CAW
07-A-65 Remote Weather Station

FISCAL YEAR 1966

Communications/Electronics Br.

01-A-66 Surveillance Transmitter
02-A-66 Vehicle Ignition Detection
03-A-66 Specifications for Improved Jungle Radio
04-A-66 Ambush Transmitter
05-A-66 Improved PRT / Antenna Coil
06-A-66 Mine Detection
07-A-66 Spin Polarization System
08-A-66 Mine Firing Switch MFS - X1
09-A-66 Ferrite Antennas
10-A-66 Hilbert Transform & SSB-FM Radios
11-A-66 Thermal Ducts in Tropical Jungle and their Influence on RF Propagation
12-A-66 Electro Magnetic Sensor
13-A-66 Use of Radioisotopes in Jungle Warfare
14-A-66 Jungle Antenna for PRC-25

Munitions Br.

01-A-66 Canopy Marker
02-A-66 Crossing and Ascent Device (CAD)
03-A-66 Smoke Grenade Dispensers, SGD-1
04-A-66 M60 Machine Gun Ammunition Feed Investigation

Mobility Br.

01-A-66 Investigation of Aeroquip Lowering Device
02-A-66 Airborne Medical Extraction System
03-A-66 Methods of Ascent and Descent for Canopy Platform
04-A-66 Evaluation of Astrolux High Intensity Search Light

05-A-66 Aerial Pick-up System
06-A-66 Tunnel Flusher
07-A-66 All Terrain Portable Heliport
08-A-66 Heliport Dust Suppression
09-A-66 Troop Foot Bridge for Canal Crossing, Back-Packable
10-A-66 Mobile Elevated Surveillance and Gun Platform
11-A-66 Ammunition Resupply Vehicle

Environment/Survival Br.

01-A-66 Investigation of Non-Glare Diffused Light
02-A-66 Cliff Hanger
03-A-66 Feasibility of Field Installing Drainage Holes in Combat Uniforms
04-A-66 Feasibility Study on Caltrops
05-A-66 Lightweight, Stable, Breath-Inflated Boat
06-A-66 Shower Bucket
07-A-66 Feasibility of Flotation Gear for Water Crossings, Individual

Applied Chemistry Br.

01-A-66 Conceptual Utilization of the Anti-Crop Munition System - I
02-A-66 Fabrication of Defoliant Grenades
03-A-66 The Use of Pseudoplastic Materials for Area Denial
04-A-66 Stored Water Potability
05-A-66 MAD Plus CN Assessment
06-A-66 Utilization of Miniature Gas Turbine Pump with Man Portable Flame Thrower
07-A-66 Emergency Battery Recharging Kit for Use in Remote Areas
08-A-66 Feasibility of Detection by Luminescence

Applied Physics Br.

01-A-66 Neutron Detection of Explosives
02-A-66 Radiation of Weapons - IR
03-A-66 G-A (Ground to Air) Position Marker
04-A-66 Polaroid Aerial Reconnaissance
05-A-66 Night Formation Flying Aid
06-A-66 Close-up Camera Evaluation
07-A-66 Evaluation of "Proposed Idea for Detecting Men Carrying Rifles"
08-A-66 Detection of Command Detonated Explosives
09-A-66 Weapons Denial
10-A-66 All-Weather Writing Materials
11-A-66 Mortar Location Study
12-A-66 Hydro-Acoustic Surveillance
13-A-66 Tunnel Data Analysis
14-A-66 Detection of Camouflaged Vehicles

Biological Sciences Br.

01-A-66 Biologically Clocked Mechanisms
02-A-66 Use of Mag-Tef in Adapter for M-79 G L
03-A-66 Conceptual Utilization of the Anti-Crop Munitions System - II
04-A-66 Physiological Effectiveness of Napalm B
05-A-66 Physiological Effectiveness of Westco Gel

06-A-66	Aerial Surveillance Handbook - Rhade Tribal Area
07-A-66	Feasibility of Using Mag-Teflon and CS in a Dispensing System
08-A-66	Interrogation Aid Review
09-A-66	Evaluation of Filter Materials and Techniques
10-A-66	Antipersonnel Effectiveness of "Fourth of July Type Skyrockets"

FISCAL YEAR 1967

Communications/Electronics Br.

01-EA-67	Expedient Illumination Device
02-EA-67	Concealed Vehicular Antennas
03-EA-67	Discreet Signalling Device
04-EA-67	Test of Base Station Loop
05-EA-67	Glide Slope Light
06-EA-67	Air Boat Communications

Munitions Br.

01-FA-67	Armor by the Meter
02-FA-67	Line Projector for Pistols
03-FA-67	Feasibility of Using Electric Primers in Multi-Projectile Systems
04-FA-67	Sound Level Reduction
05-FA-67	Feasibility of Caliber .30 (Carbine) Machine Pistol
06-FA-67	Remotely Controlled M60 Machine Gun Installation
07-FA-67	Method of Launching Battlefield Illumination System from Mobile Platform
08-FA-67	Armor Kit for 2-½ ton M55 Truck
09-FA-67	Night Aiming Device for 3.5 "Rocket Launcher
10-FA-67	Evaluation of Rocket Guns
11-FA-67	Aircraft Dispensing of GFA

Mobility Br.

01-MA-67	Tunnel Exhaust (Resojet)
02-MA-67	Preliminary Evaluation of Giant Wheel
03-MA-67	Sandbag System Development
04-MA-67	Chain & Brush Cutting Saws
05-MA-67	Marsh Skiis
06-MA-67	Differentiation Study - Balloon Light VS Gunfire
07-MA-67	"Maple Seed"
08-MA-67	Mobile, Delta Mortar Mount
09-MA-67	Feasibility Study, Bumper Adapter for Lunette Equipped Trailers
10-MA-67	Nighttime Position Marker for Water Covered Areas

Environment/Survival Br.

01-SA-67	Reusable Cover for Free - Drop Water Container
02-SA-67	To Determine a Method of Reducing Cockpit Temp. of the Mohawk Aircraft on the Ground
03-SA-67	Cheap, Lightweight, Compact Sandbag
04-SA-67	All-Purpose, Lightweight, Trap for Survival

Applied Chemistry Br.

01-CA-67	Equipment Use Denial Munition
02-CA-67	Smoke Cartridge for Firecams
03-CA-67	Mini Grenade, White Phosphorus
04-CA-67	Mini Grenade High Explosive Fragments
05-CA-67	To Investigate the Reduction of Small Arms Spallation Produced in Helicopter Floors
06-CA-67	Initiator-Detonator for Mini Grenades
07-CA-67	Mini Grenade Signal Flare
08-CA-67	Landing Zone Direction Signal System - Electroluminescent
09-CA-67	Nylon Tire Cord Infiltration Barrier
10-CA-67	Electrical Properties of Electroluminescent Tape Lights

Applied Physics Br.

01-PA-67	Device for Improving the Operation of LLTV Devices
02-PA-67	Rapid Detection and Mapping of Tunnels
03-PA-67	Secure Position Marker
04-PA-67	"Tunnel Rat" Detection Using E&R
05-PA-67	LLL IV Monitor Filter
06-PA-67	Evaluation of HR-2X
07-PA-67	IR Mortar Flash Signature
08-PA-67	Flash Detection, Mortar
09-PA-67	Evaluation of the Bendix AN-SP 113 Radar Installed in a UH-1D

Biological Sciences Br.

01-BA-67	Antigens for Immunological Marking of Personnel
02-BA-67	Injectable Foam Plastics Study
03-BA-67	Perimeter Illumination
04-BA-67	Spinning Reel Concept for Set Air Burst Above Ground
05-BA-67	Lightweight Biological Time Delay
06-BA-67	Encapsulation
07-BA-67	Countermeasures Against Dogs
08-BA-67	Analysis of Incendiary Agents
09-BA-67	Waste Disposal Unit
10-BA-67	Application of Ion Exchange Resins
11-BA-67	Field Refrigeration Unit
12-BA-67	Adapter for Water Filtration Pump

FISCAL YEAR 1968

Communications/Electronics Br.

01-EA-68	Data Processing Equipment
02-EA-68	Land Illumination Remotely Activated Flashlight
03-EA-68	Floating Landing Light
04-EA-68	High Mast for Erection by Helicopter
05-EA-68	Path Finder Device
06-EA-68	Compact Antenna for the AN/PRC-25
07-EA-68	Miniaturized Floating Light

Munitions Br.

01-FA-68	Electrical Initiation of M49 Trip Flare
02-FA-68	ROBOS Feasibility Study
03-FA-68	Floor Plate Armor For Trucks
04-FA-68	Evaluation of Multiple Circuit Detonator Device
05-FA-68	Fabrication of Fifteen (15) ARTS
06-FA-68	Flotation Device for Standard Smoke Grenade
07-FA-68	M60 Door Gunner Sight
08-FA-68	Back-Pack Ammunition Feed System for the M60 Machine Gun
09-FA-68	Feasibility Study of Aircraft Ballistic Shelter
10-FA-68	Rifle Rack for Helicopters
11-FA-68	Bearing Finder for Incoming Fire
12-FA-68	Modified Smoke Grenade

Mobility Br.

01-MA-68	Wobble Wheel Kit Adaptor for M151
02-MA-68	Cable Ferry
03-MA-68	Medium Weight Sandbagger
04-MA-68	Track Width Extender Kit
05-MA-68	Feasibility Investigation of Water Cannon for River Bank Bunkers
06-MA-68	Evaluation of Commercial Anchor Capstan System for Trucks
07-MA-68	Helicopter Payload Capability Meter
08-MA-68	Feasibility Investigation, Man-Portable Bunker
09-MA-68	Handle for 105MM Round

Environment/Survival Br.

01-SA-68	Durable Lightweight Waterproof Plastic Wallet
02-SA-68	Lightweight Carrying Case for AN/GRC-109 Radio
03-SA-68	Lightweight, Reverse Osmosis Water Purifier
04-SA-68	Human & Mess Hall Wastes Disposal
05-SA-68	Low Cost, Simple Solar Stills for RVN Peasant Farmholds
06-SA-68	Fuel Units of Acetal Resins
07-SA-68	Dissemination of Incapacitating Agent
08-SA-68	Hot Air Balloon Illuminating Device
09-SA-68	Feasibility Study of a Waterproof Plastic Map Protector

Applied Chemistry Br.

01-CA-68	Helicopter Exhaust Ducting for "CS" Dispenser
02-CA-68	Rice Denial
03-CA-68	Microencapsulation of Sensing Chemicals
04-CA-68	Feasibility Study of Fire Cartridge
05-CA-68	Smoke Capability for Air Boat
06-CA-68	Mobility Deterrent

07-CA-68	Measurement of the Vapor Pressure of Various Explosives at Elevated Temperatures
08-CA-68	Fuel Drop Identification
09-CA-68	Marking and Tracking by Ultra Thin Polymer Flakes Incorporating Acridone
10-CA-68	Permanent Position Marking Device

Applied Physics Br.

01-PA-68	Sorption Detector
02-PA-68	Use of an RF Transmitter as a Ground to Air Beacon
03-PA-68	Use of the ARC-54 Radio to DF on the Dog Transmitters
04-PA-68	Investigation of IR in Tunnels
05-PA-68	Daylight Screen
06-PA-68	Evaluation of Westinghouse Electron Beam Magnetometer
07-PA-68	Ground Currents
08-PA-68	Smiper Detection System
09-PA-68	Reduced Size Ground Plate Antenna for AN-PRC-25 Radio
10-PA-68	Listening Post Surveillance Radar (LPSR)

Biological Sciences Br.

01-BA-68	Instant Stretcher
02-BA-68	Harrassing Techniques
03-BA-68	Thin Film Plastic Applications
04-BA-68	Instant Incapacitation
05-BA-68	Ecological Reconnaissance
06-BA-68	Feasibility of Using CS-Mag-Tef as Single Pellet
07-BA-68	Investigation of IR Sources to Detect Off-Leash Dogs
08-BA-68	Investigation of Field Mess Hall Waste Disposal Applications
09-BA-68	Feasibility of Chemiluminescent Smoke
10-BA-68	Expedient Life Support Study
11-BA-68	Bioluminescence Investigation
12-BA-68	Antipersonnel Effectiveness of CS/Mag-Tef Pellet
13-BA-68	Use of "Super Balls" as Anti-Riot Device
14-BA-68	Lightweight Weather Resistant Dog Harness

FISCAL YEAR 1969

Communications/Electronics Br.

01-EA-69	Ambush Light
02-EA-69	Quiet Operation of AN/PRC-25
03-EA-69	Remote Operation of Aiming Post Light
04-EA-69	High Intensity Colored Lights
05-EA-69	Fence Break Alarm Study
06-EA-69	Radioactive Markers
07-EA-69	Luminous 1/2 Life Comparison Study of Map Readers Employing PM-147 and H-3
08-EA-69	Illumination of Survival Compass

Munitions Br.

01-FA-69	Quick Rocket Loader
02-FA-69	Sling Adaptors for the M16 Rifle
03-FA-69	Remote Sequential Initiator
04-FA-69	Point Man Booby Trap Protector
05-FA-69	Stabilized Machine Gun Mount
06-FA-69	Grenade Launcher for M16 Rifle
07-FA-69	XM183 Parachute Surface Flare Launcher Investigation

Mobility Br.

01-MA-69	Air Inflated Troop Foot Bridge Evaluation
02-MA-69	Multi-Purpose Manpowered Pump
03-MA-69	Wind/Water Driven Generators
04-MA-69	Investigation of the Potential of Ferro-cement in Nation Building
05-MA-69	Evaluation of Commercial All-Terrain Vehicle
06-MA-69	Feasibility Investigation/Self-Erecting Bunker Shell
07-MA-69	Cargo Handling Davit Kit, Universally Adaptable to Military Tactical Trucks
08-MA-69	Sensory Feedback System for Prosthetic Legs
09-MA-69	Bridge Protection Against Swimmers
10-MA-69	Detonation Tube for Vehicle Bank Egress

Environment/Survival Br.

01-SA-69	Improvement to Support Rods for Shelter, Lightweight, Medical Treatment, Special Forces
02-SA-69	Determination of Yield from "Water Organ"
03-SA-69	Recent Exploration Equipment Design
04-SA-69	Study of Swimmer Incapacitation by Arhythmic Stimuli

Applied Chemistry Br.

01-CA-69	Assess Feasibility of Dispenser, LWL Task 08-C-68 as Smoke Generator for OV-1
02-CA-69	Assess Feasibility of Mark 12 as Smoke Generator for OV-1
03-CA-69	Evaluation of the Double-Sided Electroluminescent Signal Paddle
04-CA-69	Gas Absorption and Emission Spectra from 10-100KMHZ

Applied Physics Br.

01-PA-69	Booby Trap Detection and Location
02-PA-69	Magnetic Detection of Moving Metal
03-PA-69	Laser Communicator
04-PA-69	Laser Pointer (IR)
05-PA-69	Fluorescence of Explosives
06-PA-69	Remote, Passive Detection of Vapors
07-PA-69	Flight Test of Loran Tactical UTM Navigation System
08-PA-69	Large Area Blast Material
09-PA-69	Electret Transducers

Biological Sciences Br.

01-BA-69	Analysis of Sputum for Lead
02-BA-69	Preventive Assassination by Detection of Close Range
03-BA-69	Thermoelectric Water Purification
04-BA-69	Investigation of Alternate Power Source for Centrifuges for Use in the Field
05-BA-69	Disposable Food Container
06-BA-69	Investigation of Encapsulation Materials for use as Heat Sources/Absorbers
07-BA-69	Investigation of an Incendiary Pop-up Antipersonnel Mine
08-BA-69	Investigation of an Incendiary Hand Grenade
09-BA-69	Methods for Exploiting Marine Life as Food Resources
10-BA-69	Application of Search Instrumentation for Riot Control
11-BA-69	Portable Kennel System
12-BA-69	Lie Detection by Voice Analysis

FISCAL YEAR 1970

Communications/Electronics Br.

01-EA-70	Aircraft Antenna System
02-EA-70	Jungle Headset
03-EA-70	Perimeter Defense System
04-EA-70	Antenna Study for PRC-25
05-EA-70	Hearing Aid for Helmeted Personnel
06-EA-70	Auxiliary Aircraft Radio
07-EA-70	Investigation of Security Services
08-EA-70	Quiet Hand Sets for 7 Corps
09-EA-70	Investigation of Airborne Interrogator

Munitions Br.

01-FA-70	Redesigned Front Sling Adaptor for the M16
02-FA-70	Ballistically - Placed, Tethered - Balloon Position Marker
03-FA-70	Hand-Held K. Band Radar Rocket
04-FA-70	M16 Signaling Round
05-FA-70	File Destruct

Mobility Br.

01-MA-70	30 Round M16 Magazine
02-MA-70	Flat Corrugated Plate Bunker Roof
03-MA-70	Bunker Housing/Field Fortification Kit
04-MA-70	Evaluation of Current DMZ Fence Lighting in Korea
05-MA-70	Investigation of Solid Chemical Hydrogen Generator
06-MA-70	Investigation of Vibratory Powered Tools and Vibratory Hand Tools
07-MA-70	Bunker Heater
08-MA-70	Honda Take-Off
09-MA-70	Investigation of Anhydrous Ammonia Vapor Balloon using High Radiation Absorption Low Radiation Emmittance Plactic Film
10-MA-70	Remote Area Construction

Environment/Survival Br.

01-SA-70	Manually Applied Lamination
02-SA-70	Water Resistant Writing Paper
03-SA-70	Bunker Heater
04-SA-70	Improved Insect Repellent
05-SA-70	Evaluation of Tent, Medical Treatment in RVN
06-SA-70	Investigation of Military Ski Binding Design
07-SA-70	Bunker Marker

Applied Chemistry Br.

01-CA-70	Atmospheric Dispersion of Cooking Odors
02-CA-70	Determination of Effluvia from Flowering Cannabis
03-CA-70	Population Control Disseminator
04-CA-70	Ecological Control Technique Sprayer
05-CA-70	Use of Chemically Sensitized Animal to Detect Specific Chemical Effluents
06-CA-70	Friendly Patrol Identification Via Night Hawk
07-CA-70	Utilization of all Terrain Vehicle
08-CA-70	Marking of Nighthawk Helicopter with Electroluminescent Tapelight
09-CA-70	Investigation of a Light Emitting Diode for an IR Flashlight
10-CA-70	Rapid Destruction of Documents by Air Enrichment Techniques
11-CA-70	Feasibility Study of Patrol Marking Materials with an Airborne Nighthawk System
12-CA-70	Detection of Cannabis by Reagents
13-CA-70	Sonic Noise Generator

Applied Physics Br.

01-PA-70	Silent Tank Mounted Searchlight
02-PA-70	Explosive Detection Using Raman Spectroscopy
03-PA-70	Drug Detection Using Raman Spectroscopy
04-PA-70	Solid State Laser for Raman Spectroscopy
05-PA-70	Hydrocarbon/Fuel Detection
06-PA-70	Ultrasonic CW Radar
07-PA-70	Nuclear Quadrupole Resonance

Biological Sciences Br.

01-BA-70	Detection of Detergents in Streams
02-BA-70	Weather Resistant Durable Dog Muzzles
03-BA-70	Detecting System (Falcon)
04-BA-70	Mag-Teflon Fougasse
05-BA-70	Laci Device with 2.75 Rocket Assist
06-BA-70	Feasibility of Using Mag-Tef in the M18 A1 Mine
07-BA-70	Mobile Assistance Unit for Remote Areas
08-BA-70	Countermeasures Against Tracking Dogs
09-BA-70	Rotary Tube Sprayer
10-BA-70	Detection of Hydro-Carbons
11-BA-70	Use of Sonograph for Voice Analysis
12-BA-70	Use of Mag-Teflon in the M16 Antipersonnel Mine
13-BA-70	Simple Bell Mine
14-BA-70	Insecticide Sprayer Test/Evaluation

Technical Support Div.

01-TA-70	Rotary Wing Tip Illuminator
02-TA-70	Pump for Corrosive Fluids (Brackish water, etc.)
03-TA-70	Fabrication of Six (6) each Mount, Grenade Launcher (M79)

Special Activities Div.

01-YA-70	Battlefield Illumination
02-YA-70	Preliminary Feasibility Investigation of a Hand-Held Intrusion Detector
03-YA-70	Miniature Materiel Incendiary Grenades
04-YA-70	Laminated Body Armor

FISCAL YEAR 1971

Communications/Electronics Br.

01-EA-71	Radio/Telephone Switch Board
02-EA-71	Helmet Radio for Civil Disturbance
03-EA-71	Helmet for Civil Law Enforcement
04-EA-71	Gas Mask for Helmet Radio
05-EA-71	Demonstration Models of Map Readers
06-EA-71	Radio Signalling System
07-EA-71	Investigate Method of Hands-Free Monitoring of the PRC-25/77 while on the Move
08-EA-71	Unconventional Tactical Communications
09-EA-71	Dipole Antenna for C&C Ships
10-EA-71	Interface of Headset, H-161/GR, PRC-25 and I/C
11-EA-71	PRC-25 Mounting Hardware for C&C Ships

Munitions Br.

01-FA-71	2.75" Bunker Marker
02-FA-71	Frag Grenade Holder
03-FA-71	Multiple Baton Shell for the M79
04-FA-71	Modified Barrell for M3 Machine Gun
05-FA-71	Artillery Direct Fire Training Round
06-FA-71	Evaluate German 5.56MM Plastic Training Ammunition
07-FA-71	20MM Subcaliber Training Ammunition
08-FA-71	Self-Destruct M14 AP Mine
09-FA-71	Self-Destruct M-8/18 Fuze and Can
10-FA-71	Ambush Light, Seismic Initiated
11-FA-71	Arctic Crossing Munition

Mobility Br.

01-MA-71	Soil Stabilization
02-MA-71	Investigation of External Combustion Engines
03-MA-71	Investigation of Elevated Radio Relay Deployment System
04-MA-71	Off-Runway Handling Gear for Helicopters
05-MA-71	Support Base Lighting
06-MA-71	Exhaust Fog

Environment/Survival Br.

01-SA-71	Detection of Poison in Plants
02-SA-71	Arctic Canteen
03-SA-71	Plastic Handcuffs
04-SA-71	Clothing and Foot Gear for Tank Crews
05-SA-71	Rain Gear for Tank Personnel
06-SA-71	Cold Weather Survival Kit, Seat Pack
07-SA-71	Toilet Article Kit
08-SA-71	Knife Cutter-Bayonet
09-SA-71	Improvement of Helmet Liner
10-SA-71	Insulation of Tool Handles for Arctic Service
11-SA-71	Super-Light, Compact Urban Wall Sealing System
12-SA-71	Waste Disposal - Arctic
13-SA-71	Barrier Coatings for the Skin
14-SA-71	Fence Post Hammer

Applied Chemistry Br.

01-CA-71	Evaluation of 30 Cycle/Second Detection System
02-CA-71	Rapidly Inflatable, Impregnated Barriers
03-CA-71	Dilatant Fluid, Projectile Study
04-CA-71	Determination of State-of-the-Art of Metal Embrittlement
05-CA-71	Disruption of Petro-Chemical Supply Lines
06-CA-71	Tracking and Detection of Floating Stores
07-CA-71	Narrow Band Imaging in the UV
08-CA-71	Feasibility of GO-NO-GO Mortek Heroin Detector
09-CA-71	Plastic Irritants for Riot Control
10-CA-71	Identification POL Products
11-CA-71	Investigation of Over Pressure of Fuel Air Explosives
12-CA-71	Mine Clearance with DETA Sheet Technique
13-CA-71	Techniques for Analysis of Addictive Drugs
14-CA-71	Hollow Catheter Technique
15-CA-71	Free Radical Technique for Drug Detection in Body Fluids
16-CA-71	Feasibility Study of the Interfacing of a LORAL Map Plotter with th...

Applied Physics Br. LORAN Navigation System

01-PA-71	Particle And Chemical Visibility
02-PA-71	Improved Secure Illuminator
03-PA-71	Pulsed NQR Detection Device
04-PA-71	Air Marshal Signalling System
05-PA-71	Rotor Radar Bullet Detector

Biological Sciences Br.

01-RA-71	Preliminary Evaluation of Lithium Mag Slurry
02-BA-71	Demonstration of High Energy Q Sphere Dispensing Apparatus
03-BA-71	A Chemical Detection Method for Weapons
04-BA-71	Feasibility of Using Special Tracker Dogs for Civil Disturbances
05-BA-71	New Analytical Techniques for Detection of Emotional Stress
06-BA-71	Icyball Refrigeration System
07-BA-71	Bridge Security Study
08-BA-71	Feasibility of New Improved LAW Warhead
09-BA-71	New Off-Leash Training Techniques
10-BA-71	Corfam Dog Equipment
11-BA-71	Road Mine Clearing
12-BA-71	Depot Security Station
13-BA-71	Mobility Machine

Technical Support Div.

01-TA-71	Remote Sensor Plotting Board
02-TA-71	Ancillary Equipment and Material to Enhance Mount, Grenade Launcher (M 79) Fabrication Effort in RVN
03-TA-71	Remote Sensor Plotting Board Evaluation
04-TA-71	Vietnamization of Mount, Grenade Launcher (M 79)

Special Activities Div.

01-YA-71	Feasibility of Developing Personal Weapons for Military Attaches and Other Members of Diplomatic Staffs
02-YA-71	Sheet Steel Penetrator

FISCAL YEAR 1972

Communications/Electronics Br.

01-EA-72	Support MP Agency Request
02-EA-72	Power Supplies (Portable) for AN/PRC-77
03-EA-72	Illuminated Map Readers for Alask
04-EA-72	Control, Remote Retransmission Unit C-7772/GRC
05-EA-72	Investigation of Automatic Switchboards

Munitions Br.

01-FA-72	Feasibility Study, M301A3, Illuminating Cartridge
02-FA-72	Tank Firing Table Subcaliber Training Round
03-FA-72	Modified Chamber Brush for M16 Rifle
04-FA-72	Midi Flare
05-FA-72	More Lethal Projectiles
06-FA-72	M60 Grenade Launching Attachment
07-FA-72	Pyrotechnic Light for Night Photography
08-FA-72	Swimmer Deterring Munition
09-FA-72	M16 Deflecting Device

Mobility Br.

01-MA-72	Batteries for Arctic Vehicles
02-MA-72	Bunker/Revetment Erector Set
03-MA-72	Light System for the National Guard
04-MA-72	Walking Beam Vehicle Testbed Modification and Evaluation
05-MA-72	Squad Support Vehicle Concept Study
06-MA-72	Secure Tie-Down for Arctic Environment Shelter
07-MA-72	M151 Truck Hardtop Kit, Feasibility Investigation of New Material
08-MA-72	Helicopter Camouflage

Environment/Survival Br.

01-SA-72	Evaluation of Caprcclacte Nylon as a Membrane for the Purification of Water
02-SA-72	Improved Fire Starter
03-SA-72	Cheap, Rapid, Silk-Screen Preparation
04-SA-72	Improved Snaplink
05-SA-72	Supplementary Oxygen for High Altitude Operations
06-SA-72	Flap Valve Driven Rotor
07-SA-72	Reduce Abrasion of Windblown Sand on Goggles
08-SA-72	Lightweight, Inexpensive Weather Kit
09-SA-72	Case for Protecting Ponchos

Applied Chemistry Br.

01-CA-72	Determination of Origin of Heroin Vials
02-CA-72	Battery Heater
03-CA-72	Chemilumenescent Rotor Tip Lighting
04-CA-72	Electrophoresis Technology as Applicable to the Detection of Chemicals in Body Fluids
05-CA-72	Comparative Evaluation; Explosive Detectors
06-CA-72	Evaluation of a Modified VTA Sampling Valve
07-CA-72	Feasibility of Saliva Test for Hashish
08-CA-72	Camouflage Material
09-CA-72	Obscuration of Optics
10-CA-72	Mirage Camouflage
11-CA-72	Super Reflector

Applied Physics Br.

01-PA-72	Vapor Detection Enhancement
02-PA-72	Land Navigator, Vehicular
03-PA-72	Liquid Optical Coatings
04-PA-72	Ground Resistance Sensor
05-PA-72	Detonation Kinetics
06-PA-72	Aircraft Boarding Lights
07-PA-72	Static Electricity in Alaska
08-PA-72	Facsimile Equipment
09-PA-72	Thermal Barriers
10-PA-72	Unintentional Radiation
11-PA-72	Multifrequency Material/Shape/Size Discriminating Mine Detection Investigation

Biological Sciences Br.

01-BA-72	New Antipersonnel Device
02-BA-72	Evaluation of Samarium Cobalt (SAIS)
03-BA-72	Personal Water Dispenser/Container for Cold Climates
04-BA-72	Evaluation of Universal Adapter Kit (Police Radio)
05-BA-72	Field Centrifuge
06-BA-72	Hand-held Super Ball Launcher
07-BA-72	Enzyme Detection of Drugs
08-BA-72	Security Devices
09-BA-72	Static Electricity Neutralization
10-BA-72	Portable Skid

Technical Support Division

01-TA-72	Tent Anchoring Device for Ice Areas
02-TA-72	Variable Velocity Linear Accelerator for Non-Lethal Projectiles
03-TA-72	Pyrotechnic Heat Cartridge Adaption for Cold Environment
04-TA-72	Jelled Projectile (12 Gauge) for Harrassment, Markings or Persistent Material
05-TA-72	Vehicle Warm-Up Control System
06-TA-72	Electronically Heated Grounding Rod for Use With Generating Equipment on Frozen Ground

Environment/Survival Br.

01-SA-73	Weapons Cover, Small Arms
02-SA-73	Grounding Rod Driver
03-SA-73	Roll-Up Map Board (For Keeping Tactical Situation Maps)
04-SA-73	Canteen Double-Boiler/Lid
05-SA-73	Load Carrying Concept Study
06-SA-73	Improved Cold Water Diving Suit

Applied Chemistry Br.

01-CA-73	2.75-Inch Chemiluminescent Simulators
02-CA-73	Ultrasonic Projectile Investigation
03-CA-73	Anti-Concealing & Anti-Friction Compounds for Arctic Service
04-CA-73	Aerosol Indicator for Explosives
05-CA-73	Feasibility of Detection of PCP(Pentachlorophenol)
06-CA-73	Foam Metal Concentrator
07-CA-73	Cone Optic Laser Pulse Detector

Applied Physics Br.

01-PA-73	IRCM Techniques
02-PA-73	Radar Reduction Techniques
03-PA-73	Line Intrusion Detector (LID)
04-PA-73	Sensor Delivery
05-PA-73	Vehicle Barrier
06-PA-73	Thermal Materials Study

FISCAL YEAR 1973

Communications/Electronics Br.

01-EA-73	HF Loop Antenna Evaluation
02-EA-73	Design of a Combination Illuminated Compass/Map Reader
03-EA-73	Investigation for Tactical Light Sources
04-EA-73	Artillery Muzzle Velocity Errors
05-EA-73	Helicopter Assist Landing and Take-Off Device
06-EA-73	Non-Printing, Portable Teletype
07-EA-73	TV Surveillance System

Munitions Br.

01-FA-73	M16 Case Deflector-Documentation
02-FA-73	Bullet Firing Device
03-FA-73	Paradrop Sight Feasibility
04-FA-73	Armor Piercing Mechanism
05-FA-73	More Lethal Projectiles-II
06-FA-73	Training Device
07-FA-73	Range Finding Sight
08-FA-73	Grenade Launcher Subcaliber Device

Mobility Br.

01-MA-73	Battery Heating-New Approaches

Biological Sciences Br.

01-BA-73	Detection of Hepatitus Virus
02-BA-73	Dog Handler's Aid Kit
03-BA-73	Drug Identification
04-BA-73	Brid Sensor System
05-BA-73	Bio-Sensor Target Acquisition System
06-BA-73	All-Electric Dichlorvos Dispenser
07-BA-73	Body Armor Assessment
08-BA-73	Canine Transport of Military Operations Equipment
09-BA-73	Liquid-Filled System for Animal Transport
10-BA-73	Icy Ball Refrigerator Stove
11-BA-73	Evaluation of Advanced Stress Analyzer
12-BA-73	Evaluation of Weather Kit

Technical Support Division

01-TA-73	Nonskid, All Size Footwear Spikes
02-TA-73	Electrically Heated Grounding Rod for Use with Generating Equipment on Frozen Ground
03-TA-73	Pyrotechnic Heat Cartridge Adaptation for Cold Environment
04-TA-73	Vehicle Warm-Up Control System

Research Analysis Office

01-YA-73	Military Use of Effluent Detectors

FISCAL YEAR 1974

Communications/Electronics Br.

01-EA-74	Solar Powered Battery Charger
02-EA-74	Improved HF Loop Antenna
03-EA-74	Amplifier, Audio Frequency AM 64-82 (ZAIQ-10) Parameter Interrelationships

Munitions Br.

01-FA-74	Grenade Launcher Subcaliber Device - II
02-FA-74	Soda Straw Projectile (Feasibility) - I
03-FA-74	40mm Spigot Projectile
04-FA-74	Gun Noise

Mobility Br.

01-MA-74	Concept Development - Helicopter Towing Kit
02-MA-74	Investigation of Microporous Plastic for Water Purification

Biological Sciences Br.

01-BA-74	Gas - Operated Pistol
02-BA-74	Force Measurement Using Carbonless Paper
03-BA-74	Use of Trained Primates in Less-Lethal Studies
04-BA-74	Exploratory Study of Controlled Agression in Dogs
05-BA-74	Evaluation of Protective Creams
06-BA-74	Biological Battery
07-BA-74	Evaluation of Medical Meeting Minutes

Technical Support Division

01-YA-74	Improved Hand-launched Antitank Device for Urban Warfare
02-YA-74	Antimateriel Damage Mechanism

Research Analysis Office

01-YA-74	Improved Hand-Launched Antitank Device for Urban Warfare
02-YA-74	Antimateriel Damage Mechanism

DIRECTOR OF DEFENSE RESEARCH AND ENGINEERING
WASHINGTON, D.C. 20301

30 Sept 65

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY
(RESEARCH AND DEVELOPMENT)

SUBJECT: Limited Warfare Laboratory

I am highly encouraged by the substantial contribution of the U.S. Army Limited War Laboratory to Project PROVOST. In the few years since its establishment the Laboratory has proven, dollar for dollar, to be the most productive of the many existing efforts to meet the equipment needs of the nation's counterinsurgency efforts. The able leadership of the Chief of Research and Development and his staff, and the Laboratory's technical director, are to be commended for their part in this success.

For these reasons I approved an expanded budget for this facility, as part of PROVOST, which represents about a 50% increase in its level of effort. I wish this expansion to be supported strongly in all respects -- additional projects, personnel, equipment, facilities, and a broader and deeper scope of applied research and equipment development effort. I know also that you will continue to guard the management structure against the inhibiting administrative and contractual restraints that sometimes go with increased size, in keeping with the quick reaction nature of the Laboratory; and that you will undertake this effort with the urgency that both the purpose of the Laboratory and Project PROVOST demand.

Harold Brown

Harold Brown

U. S. ARMY
LIMITED WAR LABORATORY
ABERDEEN PROVING GROUND
MARYLAND

LWL DIRECTIVE
NO. 25

19 JUN 1969

EXPEDITING NON–STANDARD URGENT REQUIREMENTS FOR EQUIPMENT (ENSURE)

I. PURPOSE:

The purpose of this directive is to establish a procedure for the U. S. Army Limited War Laboratory to rapidly respond to ENSURE Requirements for non-standard items and their logistic support.

II. APPLICABILITY:

Applicable to all Laboratory personnel responsible for the development of materiel items.

III. CONTENTS:

ROBERT W. McEVOY
Colonel, GS
Commanding

This directive supersedes LWL Directive No. 25, dated 3 June 1968.

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1. GENERAL

The USALWL is required to respond to ENSURE Requirements for non-standard materiel items and to provide for their adequate logistic support. This directive establishes the necessary procedures and delineates responsibilities within the USALWL to provide expeditious support to these requests.

2. DEFINITIONS

a. ENSURE Requirements - A requirement received by ACSFOR in accordance with reference 5a for non-standard materiel items for operational evaluation or tactical use.

b. Parent Agency - U. S. Army developing agency (U. S. Army Materiel Command (USAMC), Chief of Engineers (C of Engrs), U. S. Army Security Agency (USASA), The Surgeon General (TSG)), that normally sponsors the particular type of materiel under development by the USALWL. (Reference 5b.)

c. Designated Parent Agency - For the purpose of this directive, that subordinate command or activity assigned by the parent agency for further technical liaison or to directly assist USALWL in type classification actions.

d. Technical Data Package - For the purpose of this directive, the technical information available at the USALWL that may be used for procurement of the materiel. This technical data shall be as complete as possible in order to control the configuration to the desired level of design disclosure and the quantity to the required level. This data may consist of drawings and associated lists, specifications, purchase descriptions, standards, models, performance requirements, quality assurance provisions and packaging data.

e. Maintenance and Logistic Support - For the purpose of this directive, maintenance and logistic support will be that support stated in the ENSURE Requirement and/or that determined to be necessary by the USALWL. This support will be concerned with spare parts, consumable items, maintenance services, training needs, and operator and maintenance manuals. Unless otherwise directed, this support will be included as part of the contract to supply the item(s) requested. The maintenance and logistical support plans as outlined in AR 750-6, will be used as a guide, where applicable.

f. Procurement Package - The information required to obtain bids or proposals comprised of the technical data package describing the item or service to be procured together with all applicable administrative, legal and fiscal provisions that are necessary for a clear and complete description of the item or service desired and the conditions governing the proposed contractual agreement between the government and the supplier.

3. RESPONSIBILITIES

a. The Materiel Readiness Branch will be responsible for the implementation of this directive as outlined in the Procedures, paragraph 4, below.

b. Project Officer will be responsible for providing necessary technical information on the requested item to the Materiel Readiness Branch.

c. The applicable Task Officer of the Military Operations Division will be responsible for providing requirement status and comments concerning acceptability of the item for field use to the Materiel Readiness Branch.

4. PROCEDURES

a. Upon receipt of the information copy of the ENSURE Requirement, the Materiel Readiness Branch will complete the Materiel Readiness Checklist (Inclosure 1), by:

(1) Consultation with the project engineer to determine the development status of the item.

(2) Discussions with the Military Operations Division personnel to determine the requirements status (draft Small Developments Requirement (SDR), approved SDR or other) and an opinion on the acceptability of the item in its present state for field use.

(3) Discussions with personnel of the Southeast Asia Division, OCRD, to determine the status of the validation, funding, priority and any other pertinent information.

(4) Discussions with Program Management Division, USAMC, and/or personnel of the designated parent agency, if applicable, to determine status of funding, further coordination required and status of readiness of that agency to assume responsibility for the ENSURE Requirement.

b. From an evaluation of the information collected, the Materiel Readiness Branch will recommend the most appropriate course of action to respond to the ENSURE Requirement. The recommendation will provide information on the status of the item, additional research and development required, if any, method for obtaining the requested materiel, expected delivery dates, logistical and maintenance support implications and costs. The evaluation and recommendation(s) will be prepared in the form of a position paper (Inclosure 2) and will be staffed through the cognizant Project Officer, Branch and Division Chief, Chief, Military Operations Division, Chief, Programs/Operations Division, Chief, Special Activities Division and Technical Director to the Commanding Officer for approval.

c. Upon approval of the position paper by the Commanding Officer within 15 days of receipt of the information copy of the ENSURE Requirement, the Materiel Readiness Branch will forward two copies of this paper to the Southeast Asia Division of OCRD. Using the information provided, SEAD coordinates with DA staff and then provides guidance to the USALWL who will initiate appropriate action including the preparation and submission of a milestone schedule to SEAD within 30 days of program authorization.

5. REFERENCES

a. AR 71-7, dtd 16 Sep 68, Subject: Army Combat Developments, with change per Message DA910660, DTG 282207Z May 69, Subject: Interim Changes to AR 71-1.

b. AR 705-9, dtd 14 May 65, Subject: Research and Development of Materiel Technical Committee Functions.

c. AR 750-1, dtd 21 Jun 67, Subject: Maintenance Concepts.

d. AR 750-6, dtd 21 Aug 64, Subject: Maintenance Support Planning.

e. LWL Directive No. 28, dtd 20 Jan 69, Subject: USALWL -- USA "Parent Agency" Liaison.

f. LWL Directive No. 31, dtd 11 Mar 68, Subject: OCONUS Evaluation Plans.

2 Incls
as

MATERIEL READINESS CHECKLIST FOR ENSURE REQUIREMENT

DATE _____

ENSURE REQUIREMENT _____

STATUS OF REQUIREMENT _____ REQUESTOR _____

NUMBER OF ITEMS REQUESTED _____ USER _____

PURPOSE _____

REQUESTED LOGISTIC SUPPORT _____

APPLICABLE LWL TASK TITLE _____ TASK NO. _____

RESPONSIBLE DIV _____ BRANCH _____

PROJECT ENGR/EXT _____

RESPONSIBLE MATERIEL READINESS BRANCH ENGR/EXT _____

ITEM STATUS

R&D PHASE _____ DRAWINGS _____

EST PROCUREMENT INITIATION DATE _____ SAFETY RELEASE _____

EST SHIPMENT DATE _____

R&D CONTRACTOR _____ FLIGHT RELEASE _____

SPECIFICATIONS _____ TOXICITY RELEASE _____

OTHER _____

PARENT AGENCY _____

ADMIN PT OF CONTACT _____ EXT _____

AGENCY TECH REPRESENTATIVE _____ EXT _____

STATUS OF SDR _____ CDC AGENCY RESPONSIBLE _____

PT OF CONTACT _____ EXT _____

TENTATIVE MAINTENANCE AND LOGISTIC SUPPORT REQUIRED
(Use AR 750-6 as a guide)

SPARE PARTS _____

CONSUMABLE ITEMS _____

OPERATOR AND MAINTENANCE MANUALS _____

MAINTENANCE SERVICES _____

TRAINING TEAMS _____

ESTIMATED FUNDS REQUIRED

RES & DEV COSTS _____

ITEM COSTS _____

LOGISTIC SUPPORT COSTS _____

SPARE PARTS _____

CONSUMABLE ITEMS _____

OPERATOR AND MAINTENANCE MANUALS _____

MAINTENANCE SERVICES _____

TOTAL _____

REMARKS _____

DISPOSITION FORM

(AR 340-15)

REFERENCE OR OFFICE SYMBOL	SUBJECT
CRDLWL-9C	ENSURE REQUIREMENT: _____

TO xxxTHRU: Project Officer
Chief, Applicable Branch
Chief, Applicable Division
Chief, MOD
Chief, POD
Chief, SAD
Tech Dir

FROM C, Materiel Readiness Br DATE CMT 1

TO: CO, USALWL

1. References:

   a. ENSURE Requirement (Inclosure 1), and

   b. Materiel Readiness Checklist (Inclosure 2).

2. Readiness Evaluation:

3. LWL Recommended Action:

RICHARD G. THRESHER
Chief, Materiel Readiness Branch

CONCURRENCE:
Project Officer _____
Chief, Applicable Branch _____
Chief, Applicable Division _____
Chief, MOD _____
Chief, POD _____
Chief, SAD _____
Tech Director _____

APPROVAL: Commanding Officer _____

DISTRIBUTION:
1 cy MOD
1 cy Applicable Division
1 cy Applicable Branch
2 cys OCRD, CRDSEA

DA FORM 1 FEB 82 2496 REPLACES DD FORM 96, EXISTING SUPPLIES OF WHICH WILL BE ISSUED AND USED UNTIL 1 FEB 83 UNLESS SOONER EXHAUSTED.

USALWL FY 74 PROGRAM DEVELOPMENT

1. TASK TITLE: (Enter approved title for continuing tasks, or proposed title for new tasks)

Check Appropriate Block - ☐ New Task ☐ Continuing Task(Task No. _____). Branch and individual completing Para 3: _____

2. a. ☐ Military Need(Check if MOD initiated) b. ☐ User Evaluation(Check if this is a MOD evaluation of a task proposed in Para 3,below,by a technical branch)

(If this action is a statement of need initiated by MOD, this block will be used to reflect the problem, requirements data, user interest, hardware solution visualized, general physical parameters, general performance and military characteristics, as appropriate.)

(If this action is a user (MOD) evaluation of a task proposal by a technical branch, this block should reflect the MOD evaluation of the proposal from the point of view of requirements, user interest problem areas, military applicability, practicality, urgency of need and, as appropriate, a statement of military and performance characteristics)

(If this action is MOD response to a continuing task addressed by a technical branch in paragraph 3, below, MOD comment may be confined to a simple concurrence, or comment if considers appropriate.)

3. a. ☐ Technical Evaluation (Check if 2a is checked) b. ☐ New Task Proposal(Check if this is a proposal by a technical branch for initiation of a new task c. ☐ Continuing Task(Check if this action is by a technical branch for support of a continuing task)

(If Para 2, above, is a MOD initiated statement of military need, this block should reflect the appropriate technical branch's technical evaluation of the problem posed by MOD to include state-of-the-art comments, technical feasibility, major technical problems, proposed technical solution, related and/or parallel work in process by other agencies, estimated cost factors, test requirements and time frames for task execution.)

(If this action is a proposal by a technical branch for initiation of a new task, this block will include task objectives, technical approaches, major technical problems foreseen, related work, physical and performance characteristics of contemplated hardware, military problems the hardware is intended to solve, principal test plans and time frames for task execution.)

(If this action is in support of a continuing task, this block will reflect the current status of the task work, major technical problems encountered, impact of these problems on task execution and specific work planned for FY 74.)

4. WORK PLANNED IN FY 75 to TASK COMPLETION: (State concisely the work planned for FY 75 and thereafter to completion of the task.)

5. Prior Funds: $ (POC) Funds Required in FY 74: $_____ Funds Required in FY 75: $_____ Funds Required Beyond FY 75: $_____

ANNEX A

LWL TASK APPROVAL

Original ☐ Change No. ☐

1. Task No.
2. Reason for Revision - Change of: Funding ☐ Scheduling ☐ Milestones ☐ Scope of Work ☐
3. Task Title:
4. Related Task Numbers and Titles:

5. Security Classification	6. Date Rqmt. Received	7. Source of Requirement
8. Required Completion Date:	9. Est. Comp. Date:	10. Responsible LWL Branch
11. Task Officer:	12. Expenditure Order Number	
13. Cost Center:	14. Fund Availability (Initials of Budget Officer)	

15. Total Funds (all fiscal years) approved to date: Increase Requested:

16. Elements of Cost (Not required for Revisions)

OUT-OF-HOUSE		IN-HOUSE				
Contract	Testing	Materials	Sp. Equip	Dir Pers	Other	Total
$	$	$	$	$ M/Hrs	$	$

17. Dollar effort and scheduling for current and subsequent fiscal years:

Dollar Effort	FY $				FY $				FY $			
	FY (Qtrs)				FY (Qtrs)				FY (Qtrs)			
	1st	2d	3d	4th	1st	2d	3d	4th	1st	2d	3d	4th
Task Phasing												

Code-Phasing Symbols: R-Research; RD-Research Test; FE(S)-Feasibility Study; FE-Feasibility Test; ED(S)-Engr Design; EDT-Engr Design Test; MP-Military Potential Test; ET-Engr Test; ST-Service Test; ES-Integrated Engr/Service Test; CK-Check Test; TC-Type Classification

18. Scope of Task (Brief, concise, telegraphic-style description of work to be done)

19. Milestones for Progress Evaluation:

20. Approval:

(Date) Technical Director (Date) Commanding Officer

U. S. ARMY
LIMITED WAR LABORATORY
ABERDEEN PROVING GROUND
MARYLAND

10 August 1965

LWL Directive
No. 5

TASK APPROVAL

I. PURPOSE:

To establish procedures and responsibilities for obtaining initial approval of a Laboratory task and for accomplishing changes in task funding, scope, scheduling and milestones.

II. APPLICABILITY:

Applicable to all Laboratory personnel responsible for initiating and approving tasks and changes thereto.

III. VEHICLE:

The Task Approval Form is established as the vehicle for obtaining approval to initiate or change tasks.

IV. CONTENTS:

Robert W. McEvoy

ROBERT W. McEVOY
Colonel, GS
Commanding

This directive supersedes LWL Directive No. 5 (Interim), TASK APPROVAL AND CONTROL, dated 16 November 1962.

1. OBJECTIVES

a. To provide in a single document the necessary programming, budgeting and technical data to permit the Commanding Officer and Technical Director to evaluate and approve proposed tasks and proposed revisions to existing tasks.

b. To provide task engineers, division and branch chiefs a simple tool for planning, for measuring and scheduling work and for allocating resources.

c. To provide Executive Office with data necessary for development of a sound Operating Program/Budget, for accounting for fiscal resource allocation and for reporting.

2. RESPONSIBILITIES

a. Each Task Officer is responsible for the preparation and submission of the Task Approval Form. He is responsible for the timeliness, completeness and accuracy of the form.

b. The branch and division chiefs are responsible for assuring that the completed form reflects established objectives, is in accordance with guidance furnished and reflects a sound technical approach.

c. The Executive Office is responsible for assuring that the proposed task or change is in accord with the Laboratory program, that necessary approval from higher authority has been obtained, and that required fiscal resources are available. The Executive Office is also responsible for assigning new task numbers and Expenditure Order numbers.

d. Operations and Analysis Division is responsible for assuring that the proposed work supports established requirements.

e. The Technical Director and Commanding Officer approve the proposed task or change after assuring themselves that the proposed work supports the Laboratory mission and programmed objectives.

3. GENERAL

a. The Task Approval Form (CRD-AM Form 1003) - ANNEX A

(1) A completed Task Approval Form is required:

(a) To establish a new task

(b) To acquire additional funds for an established task

(c) To effect significant changes in the scope of work, in the scheduling or the milestones of existing tasks.

(2) Each Task Approval Form requires the approval of the pertinent branch and division chief, the Technical Director and the Commanding Officer.

In addition, the concurrences of the Executive Officer and the Chief, Operations and Analysis Division are required. Three copies of the completed form will be forwarded for approval. After approval, the original will be filed in the Executive Office, one copy in O&A Division and one copy will be returned to the branch of origin. In forwarding a Task Approval Form which requests revision of any aspect of an existing task, a copy of the original Task Approval Form and all prior, approved revisions will be attached for reference by approving authorities. In maintaining task files, copies of approved Task Approval Forms relating to the task will be stapled together in chronological order with the latest action appearing as the first page.

(3) When approved by the Technical Director and Commanding Officer, the completed form constitutes an approved LWL Task for internal programming and budgeting purposes. Upon receipt of the original copy of the approved form, the Executive Office will allocate funds in the amount approved. All costs incurred in execution of the task will be charged against these funds and will be incorporated in Program/Budget reports.

4. GENERATION OF NEW IDEAS (GNI TASKS)

a. To encourage initiative and to provide the professional staff a means for individual inquiry and investigation on a less formal basis than the Task Approval procedure, the Commanding Officer has established the concept of GNI tasks.

b. Each branch chief is authorized to obligate an amount not to exceed $20,000.00 per fiscal year nor to exceed $2,000.00 per individual task in the conduct of this program.

c. To initiate a GNI task, the individual engineer or scientist requires only the approval of his branch chief and submission of the completed GNI Task Form (CRD-AM-Form 1011) to the Executive Office.

d. The GNI Task Form 1011 is the vehicle provided for establishing a GNI Task. It is a less complex version of the standard Task Approval Form.

e. Under the GNI concept, individual inquiries and investigations which lead into areas of broader interest to the Laboratory may be formally presented on the standard Task Approval Form for incorporation as a full-fledged task in the Laboratory program.

5. PROCEDURE

a. Instructions for Completing the Task Approval Form (CRD-AM-Form 1003)

(1) Show date of preparation.

(2) Indicate original Task Approval Form by checking block. If a revision is being prepared, enter the number of the revision in the appropriate block.

b. Detailed instructions for completing the form, keyed to the numbered sections of the form follow:

(1) Task No.	Original task number is assigned by Budget Officer. To be entered only after approval by Technical Director and Commanding Officer.
(2) Reason for Revision	Check appropriate block.
(3) Task Title	Enter short descriptive title (Unclassified, if possible).
(4) Related Task Numbers and Titles	Tasks may be new approaches to established objectives or extensions or outgrowths of prior tasks. In such cases, give the task number and title of the task (or tasks) from which it emanates, or to which it relates.
(5) Security Classification	Establish lowest acceptable security classification of the proposed work.
(6) Date Requirement Received	Date requirement received from agencies outside LWL, otherwise enter date form is prepared.
(7) Source of Requirement	Identify the agency placing the requirement on LWL, i.e., - OCRD, ODCSOPS, CDC, CDOG, ARPA, AF, Internal, etc.
(8) Required Completion Date	Show date specified by Source Agency or OCRD which prescribes a time limit or date by which the output of task is required.
(9) Estimated Completion Date	If required completion date is stated, compute the completion date on the basis of expedited action; i.e., - overtime if required, optimum funding, minimum testing time, etc.
(10) Responsible LWL Branch	LWL Branch having primary responsibility.
(11) Task Officer	Enter name of individual assigned overall responsibility for task execution.
(12) Expenditure Order Number	To be inserted by Budget Officer after approval by Technical Director and Commanding Officer. (On revisions show all prior XO numbers assigned.)

(13) Cost Center

Enter appropriate cost center designation (See LWL Directive No. 4).

(14) Fund Availability

Availability of funds to be indicated by Budget Officer's initials.

(15) Funds

For a new task approval, show amount requested. For a revision, show total funds authorized to date for all fiscal years and the increase requested by this action.

(16) Elements of Cost

Provide breakout of cost elements and total required. Include contributions by other Divisions. Although this breakdown is not required for revised tasks, consideration must, of course, be given these elements in determining the amount of the increase required.

(17) Dollar Effort and Scheduling

This block should reflect:

a. For original Task Approvals, the technical and fiscal plan and time frame for accomplishment.

b. For revised Task Approvals, the plan from date of preparation of the revision. Schedule for current and future fiscal years only; do not schedule for prior years. Funding by fiscal years must be compatible with phasing; funding should reflect currently available fiscal resources (balance of prior authorization and amount requested in current action). The totals of these funds need not balance with figures in Blocks 15 or 16 for revisions.

c. Only the R&D phases and related codes defined in this block will be used for reflecting planned progress. A further definition of each of these prescribed phases is contained in ANNEX B.

(18) Scope of Task

Using telegraphic style sentences, state and describe briefly what the task is intended to accomplish.

(19)	Milestones for Progress Evaluation	Since the nature of each task will differ, meaningful check points must be tailored to the individual task. The purpose of these milestones is to assure timely evaluation of task progress for the purpose of deciding whether to discontinue, proceed as planned, expedite, or reorient. The milestone must be a period of time, or date tied to an event, a phase completion, completion of feasibility study, prototype test or other point permitting reasonable evaluation.
(20)	Approval	To be dated and signed by the Technical Director and the Commanding Officer.

c. For GII - Self explanatory.

d. Since the scope and nature of tasks vary considerably, portions of the prescribed form may not always be precisely appropriate. The back of the form may be used for additional information required for use by division or branch chiefs, to include more detailed phasing of work elements.

RDT&E PHASING (STATUS OF DEVELOPMENT)

I. R Research: Research is systematic intensive study directed toward more complete scientific knowledge of subject under study. It includes both basic and applied (supporting) research.

RE Research Test: (AR 70-10). Tests conducted during the research phase in order to confirm concepts and to further research projects and tasks.

II. FE(S)Feasibility Study: A study to determine the practicability, advisability, adaptability, and application of a proposed item or technique for the purpose envisioned.

FE Feasibility Test (AR 320-5). The determination by a process of technical examination and study of the possibility of attainment of end item materiel development. Technical feasibility consists of two parts: (1) The very long range or "state of the art" study wherein the probability of attaining general technological goals is determined; (2) The detailed feasibility study of a desired end item after military characteristics are known.

III. ED(S)Engineer Design: Study to provide the basis for the construction of an item or system. This includes design studies, design drawings, construction of mock-up models and devices and the production of prototypes.

EDT Engineer Design Test (AR 70-10). A test conducted by or under the control of the design agency where the objective of the test is to determine inherent structural, electrical, or other physical and chemical properties of construction materials, a component, subassembly, or prototype assembly, item, or system, including the effect of environmental stresses on these properties. It is characterized by controlled conditions and elimination of errors in human judgment, so far as possible, through the utilization of laboratory equipment, modern statistical methodology, and personnel trained in engineering or scientific fields. The purpose of such tests is to collect design data, confirm preliminary concepts and calculations, and determine the compatibility of components. In the case of a highly complex system consisting of a number of major integrated components (e.g., a guided missile system) the EDT may be expanded to include a complete system demonstration. Here, following component or subsystem testing, the design agency demonstrates the engineering feasibility of complete system operation.

IV. MP Military Potential Test. A test of a system, item, or component for which no definitive characteristics have been established, or conducted for the purpose of determining whether the materiel or equipment has military potential. Normally a limited test conducted under field conditions. This test does not negate the requirement for engineering and service tests prior to type classification. Ref AMCR 70-7, 4c-1.

V. ET Engineering Test (AR 70-10). A test conducted by or under the supervision of a separate test agency, not a part of the developing installation or activity concerned, using an engineering approach, where the objective of the test is to determine the technical performance and safety characteristics of an item or system and its associated tools and test equipment as described in QMR, the technical characteristics, and as indicated by the particular design. This determination includes the measurement of the inherent structural, electrical, or other physical and chemical properties and may utilize data previously generated in engineer design tests. The test is characterized by controlled conditions and the elimination of human errors in judgment, so far as possible, through the utilization of environmental chambers; physical measurement techniques; controlled laboratory, shop, and field trials; statistical methodology; and the use of personnel trained in the engineering or scientific fields. The engineering test provides data for use in further development and for determination as to the technical and maintenance suitability of the item or system for service test.

VI. ST Service Test (AR 70-10). A test conducted under simulated or actual field conditions where the objective is to determine to what degree the item or system and its associated tools and test equipment perform the mission as described in the QMR, and the suitability of the item or system and its maintenance package for use by the Army. This test is characterized by qualitative observations and judgment of selected military personnel having a field experience with the type of materiel undergoing test, with instrumentation limited to those measurements of characteristics of major operational significance. The test is conducted using soldiers representative of those who will operate and maintain the equipment in the field. The service test provides the basis for recommendations on type classification.

VII. ES Integrated Engineering/Service Test (AR 70-10). An integrated test is the conduct of engineering and service tests integrated to an optimum degree, normally at one location. An integrated test may be characterized by complete integration throughout the test, or a test in which only some phases are integrated. In some cases, an integrated test may be expanded to include engineer design test.

VIII. CK Check Test (AR 70-10). A retest performed on a service test model of selected items to determine whether major deficiencies found in the service test have been corrected, these deficiencies being of such nature that the item was found unsuitable for type classification.

IX. TC Type Classification. Materiel is type classified to provide bases upon which to judge the current qualitative adequacy of Army materiel; to record the status of an item in relation to its overall life history; and to plan and carry out its procurement, issue, maintenance, and disposal. No funding or fiscal authorization is assigned by these regulations.

EXHIBIT 24

Foreword to FY 74 Annual Progress Report

FOREWORD*

The disestablishment of the US Army Land Warfare Laboratory (LWL) in June 1974 marks the end of 12 years of quick reaction to Army needs by this unique development agency. Over 225 materiel prototypes have been delivered to Army troops in the Pacific, European and Southern Commands, Alaska and CONUS. In many instances, these prototypes satisfied an urgent need; in others, they provided a reference point for a practical and informed formulation of requirements. Those readers interested in the LWL from a philosophical or management viewpoint could see many close parallels in "Winston Churchill's Toyshop" by Stuart Macrae, the Walker Publishing Co., Inc. 1972, which is an entertaining description of the maverick agency which provided the British with some of their most innovative weapons during World War II.

The 12 years of LWL effort have seen considerable evolution in key Army problems. Insurgency in remote areas, civil disturbance, attention to the combat effectiveness of the individual soldier, response to the introduction of new technology by unfriendly nations, the increasing use of drugs, have been met with the delivery of prototype equipment. The Army of tomorrow, if it is to maintain a state of readiness in a changing environment, must continue and strengthen close liaison between the users, in combat or realistic training situations, and the inventors in Army laboratories and in industry. It is our belief that this can best be done by a lively and realistic exchange of ideas embodied in demonstration hardware rather than by lengthy exchanges of paper by people who are distant from the problem. The gaps between combat needs and statements of materiel needs, can often be dramatically eliminated by a good prototype. Armed with a demonstrable, feasible piece of hardware, the user can determine whether or not the approach is operationally sound. He can then arrive at a prompt, positive and sound decision concerning his desires for further development.

On the following pages there are two lists which highlight the accomplishment of the USALWL over the past 12 years. Since there are those who insist on keeping score only in terms of end items available in the system, we have included a list of the items which have been standardized in some form and thereby made available through the supply system. It is a very respectable record for a Laboratory which never had more than 150 people and which averaged an annual expenditure of only 7 million dollars of US Army funds. We prefer, however, to measure our success in terms of hardware delivered and actions resulting therefrom, the sorts of catalytic actions discussed in the preceding paragraph. The second list illustrates the broad spectrum of hardware developed by LWL. Each item represents the response to some problem which was very real at the time to the commander in the field. Some of the problems were local or fleeting in nature and a limited production quantity could bridge the gap until the situation changed or a better solution could be reached. Other problems still confront us but are not now recognized as being sufficiently imminent or serious to warrant stockpiling or issuing equipment. It is hoped that the proven solutions of the past will not be forgotten as similar crises arise in the future. Even without the Laboratory, LWL's files and drawings can continue to provide a capability for quick reaction.

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* From U.S. Land Warfare Laboratory FY 74 Annual Progress Report.

In announcing the disestablishment of LWL, the Commanding General, Army Materiel Command (AMC) directed that the Laboratory's function of direct liaison with the field commanders should be perpetuated. This function will be performed by a new element of the Army Materiel Systems Analysis Agency (AMSAA) to be known as the R&D Field Liaison Division. While this small group of 18 military and 17 civilians without any development capability can in no sense be considered a continuation of LWL, it will provide a bridge between the field commanders and the R&D community in a more direct manner than the formal TRADOC-AMC machinery for the establishment of requirements. If successful, it can provide a complementary means of surfacing problems and looking at solutions for some of the simpler, more immediate needs of the Army while the slower-moving machinery of the materiel acquisition process deals with the extremely complex business of acquiring major systems.

This is the final annual report of the US Army Land Warfare Laboratory.

RICHARD L. CLARKSON
Colonel, AD
Commanding

SUMMARY OF TYPE CLASSIFIED ITEMS

TITLE	REMARKS
Adjustable Ranging Telescope (M21 Sniper Rifle)	TC STD B. FSN 1005-179-0300
Automatic Alarm for Tactical Radar	TC STD A. Parent Agency directed by DA that item be standard on all ground surveillance radars.
Cartridge, Signal Smoke	FSN 1370-926-1930 (L-341)
Cartridge, Signal Smoke	FSN 1370-926-1931 (L-340)
Cartridge, Signal Smoke	FSN 1370-926-1932 (L-343)
Cartridge, Signal Smoke	FSN 1370-926-1933 (L-342)
Device to Rapidly Refuel Helicopter from 55-gallon Drums Small 25 GPM Unit Kenco Model 61MX3	FSN 4320-900-8543
Large 50 GPM Unit Kenco Model 114	FSN 4320-900-8544
Dog, Explosive	FSN 8820-043-3526
Dog, Mine and Tunnel	LWL-developed training program TC STD A. Dog assigned FSN 8820-471-1103. USMC also adopted program.
Dog, Narcotics	FSN 8820-238-8577
Dog, Scout (Off Leash)	LWL-developed training program TC STD A. Dog assigned FSN 8820-160-6152. USMC also adopted program.
Free Drop Water Container	TC STD A. 2 ENSURES by USARV. FSN 1670-832-5917 FSN 1670-832-5918 FSN 1670-832-5919
Generator, Smoke Mechanical (Air Boat Smoke Generator)	FSN 1040-420-4440
Hands-free Monitoring of PRC-25/77 While on the Move	TC STD A. included as part of PRC-25/77 by MWO.

TITLE	REMARKS
HF Radio for Jungle Use PRC-64	TC STD B. FSN 5820-985-9192
Improved Airborne Personnel Detection (XM3)	TC STD B. FSN 6665-782-1117
Improved Waste Disposal Unit	FSN 4540-762-9450
Individual Aid and Survival Kit	TC STD A. FSN 6545-782-2821 FSN 6545-782-2822 FSN 6545-782-2823
Integral Smoke Generator (ISG) Airborne	TC STD B. FSN 1040-420-4340
Landing Zone Directors Signal System	FSN 6350-519-2686
Light Set, Landing Signal AN/PVN-1	FSN 6350-179-2686
Light, Surgical, Field, 24V or 115VAC	TC STD A. FSN 6530-937-2204
Lowering Device, Personnel/Cargo Utility, 500 lb capacity, w/Tie-down assy, A/C floor anchoring	TC STD A. ENSURE by MACSOG. FSN 1670-999-0758 FSN 1670-999-3544
Mobility Augmentation Kit for M113	TC STD A. MWO made part of M113, incorporated into manual. Quantity furnished USARV, P/N 11598203.
Packet, Subsistence, Long Range Patrol	TC STD A. FSN 8970-926-9222
Polaroid Aerial Camera	TC as KS-100. ENSURE qty of 492 provided by ECOM to MACV.
Scout Dog Radio	TC STD B. FSN 5820-119-1006
Sling Adapters for M16 Rifles	TC STD A. FSN 1005-406-1570. Made optional part of rifle system by MWO.
Tagging Kit for Identification of US Government Owned Petroleum Products	See TB 703-2 dtd 29 Nov 72.
Transfrisker (Air Force)	FSN 6665-429-5935YS
Tunnel Security & Intelligence Team Protective Equipment	TC STD A.
Waterproof Notebook	FSN 7530-319-3278

ITEMS WHICH RECEIVED A SUCCESSFUL FIELD EVALUATION

TITLE	REMARKS
Acoustic Telescope	QRL qty of 10 provided by LWL to USARV.
Aerial Smoke Marker (White and Colored) Smoke Marker Dispenser	Evaluated in RVN. LP buy made by parent agency. MN prepared by CDC. Assigned to parent agency, EA.
Air Boat Communication System	Evaluated in RVN. DA approved ENSURE qty of 133 provided by ECOM to USARV.
Airboat Smoke Generator	Evaluated in RVN. DA approved an LP buy for USARV. FSN 1040-420-4340.
Airborne Television System	One Operational System supplied to JFK Center, Ft. Bragg, NC.
All Environment Survival Kit	ET/ST Check Test successfully completed. TC recommended. IPR (recommended by TECOM) will be held by NLABS.
Ambush Light	Evaluation qty of 24 supplied to ARVN. Recommended item be STD. No US Army requirement.
Analysis for Lead	Evaluation quantities supplied to ARVN (600), to MP Brigade (300) and to MP Agency (300).
Antiglare Windshields for Cobra and OH-58	ENSURE. Evaluation qty of 10 ship-sets of coated windshields provided to MASSTER/CDEC by LWL.
Armor-by-the-Yard	Evaluated in RVN. ENSURE qty of 100 kits provided by TACOM to USARV.
Arms Room Security (ARROSE)	Three systems evaluated in RVN. Adopted by MERDC for use in Joint Services Interior Intrusion Detection System (JSIIDS).
Automatic Distance Indicator	Evaluated by MASSTER.
Battlefield Illumination System	Evaluation qty supplied to RVN. As a result ENSURE qty of 60,000 requested by USARV.

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TITLE	REMARKS
CAVNAV Emergency Light Filter	Supplied to MASSTER for use in CAVNAV experiment; now part of system.
Cesium Vapor Cache Detector	Evaluated by MASSTER. ROC awaiting DA approval. Underwater system designed and furnished to US Navy.
Chemiluminescent Bundle Marker	Supplied to MACSOG.
Chemiluminescent Panel Marker	ENSURE qty of 1500 of this LWL-developed item provided to USARV by EA.
Courier Pouch	Supplied to Courier Service. State Dept evaluated and accepted. Now used.
CS Shotgun Round	ENSURE. EA provided qty of this LWL-developed item to CONARC. ET/ST program initiated.
Document Duplicator Kit	Qty of 38 provided to RVN for evaluation.
Durable, Lightweight Waterproof Plastic Wallet	Supplied to 1st Cav. Over 65,000 wallets were procured with company funds for soldiers in RVN.
Electroluminescent Runway Marking System	Qty of 5 of this LWL-developed item supplied to USARV. Recommended further development and TC.
Electroluminescent Tape Lights	QRL qty of 30 of this LWL-developed item provided to Special Forces by APG.
Emergency Arctic Battery	Evaluated by Arctic Test Center, Alaska. ROC in preparation by TRADOC.
Emergency Distress Signalling Device	Evaluated by USARAL. ROC in preparation by TRADOC.
Explosive Detecting Dogs	Supplied to Military District of Washington. Recommended TC.
Feed Adapter for M60 Machine Gun	Evaluation in RVN. ENSURE qty of 500 provided by Proj Mgr. for A/C weapons.
First Aid Kit for Dogs	USA Infantry School recommended TC.
Fog and Fungus Proof Compass	ENSURE qty of 700 provided by LWL to USARV.
FOPEN Radar	FOPEN test results provided input for ROC on ground surveillance radar.

TITLE	REMARKS
General Purpose Vehicle Heater	USARAL submitted ROC to ACSFOR. LP buy approved.
Front Line Trace Marker	Supplied to ACTIV which recommended changes and acceptance. MASSTER also evaluated.
Grapnel with Line (Propelled)	Evaluation being conducted in Alaska. ET/ST, check test successfully completed but requirement cancelled.
Ground Movement of Helicopters	LWL development led to requirement definition for approved ROC.
Gunship II	Supplied to MACSOG for operational use.
Hand Held Grenade Launcher	Supplied to MACSOG for operational use.
Helicopter Anti-IR Missile System (HAIRS)	Supplied to 1st Avn Bde, USARV.
Helicopter Dropsight	Supplied to USA Intelligence School for training and issue to divisional units.
Helicopter Navigation System	Successfully demonstrated the performance required by the MN for PANS (Positioning and Navigation System).
Heroin Detection Kit	Supplied to CID Command for evaluation.
High Efficiency Antenna	Report of LWL on-site survey supplied to CINCEUR for action.
High Frequency Loop Antenna for AN/PRC-74 Radio Set	Supplied to USARAL.
High Performance Helicopter Rescue Hoist	ROC based on LWL development prepared and submitted to DA for approval.
Icy Ball Refrigerator	Evaluated by CDTC-V in RVN. Improved model for US Army field kitchen developed for Natick.
Illuminated Map Reader	Evaluated by Alaska National Guard. TC STD recommended by Guard, also by USARAL. ROC being prepared.
Illumination Warhead, 2.75"	Successfully used by 1st Avn Brigade in night operations in RVN. Qty of 36 evaluated at MASSTER. Follow-up by 2.75" Rocket PM.

TITLE	REMARKS
Improved Elevated Site Marker	ENSURE qty supplied to MACSOG, 82d Abn by LWL.
Improved Fuel Tablet	Competitive test program scheduled with standard tablet. Natick to TC STD upon completion of program.
Improved Position Locator	STANO IPR after MASSTER test recommended further development leading to TC.
Improved Trail Machete	Natick has initiated TC action.
Individual Escape and Evasion Kit	Supplied to USAF. Adopted kit (no TC action).
Individual Water Filtration Device	Supplied to USARV. QRL qty of 1350 supplied to RVN by EA.
Interdiction Device, Hand Implaced	ENSURE qty of 50 cases provided by LWL to MACSOG.
Leather Substitute Equipment for Military Dogs	Qty of 6 evaluated in RVN. Being placed in system without ROC by a specification revision.
Leech Repellent	Evaluated in RVN. QRL qty of 50,000 bottles provided by EA to Special Forces. DA stated no requirement.
Light Aerial Platform	TECMAT. Two items supplied by LWL. Evaluated at Army Aviation Test Activity. Provided basis for Two-Man Helicopter ROC.
Lightweight Flotation Gear	Evaluation qty of 15 supplied to RVN. Results will serve as basis for ROC now in preparation.
Lightweight Mortar, 60mm	Qty of 6 supplied to MACSOG by LWL. Recommended TC.
Locking Device for Vehicle Radios	Qty of 70 evaluated by USARPAC IPR. Recommended TC STD. ROC being prepared.

TITLE	REMARKS
Marijuana Detection Kit	Supplied by LWL to CID Command
Medium-Weight Sandbagging System	ENSURE qty of 4 provided to USARV by LWL.
Midi-Smoke Grenade	Evaluation qty of 300 supplied to USARV by LWL. Product Improvement Program by Edgewood Arsenal for eventual replacement of M-18 Smoke Grenade.
Mine Firing Switch	Evaluation qty of 5 supplied to USARV by LWL. ENSURE qty of 184 provided by MUCOM to Korea.
Modified Barrel for M3 Machine Gun	Supplied qty of 20 to MACSOG for operational use.
Mount, Grenade Launcher	Supplied to ARVN and 8th Army Korea.
Multipurpose Dog (Infantry Tactical Dog)	Evaluated by CONARC. Recommended it be incorporated into dog training program.
Miniature Thermal Bar Torch	Under evaluation by MASSTER. Draft ROC data 4 Jan 74 prepared by USA Engr School.
Mini-Grenade Munitions (White Phosphorus, Thermite)	Evaluated in USARV.
Mini-Smoke Grenade XM-166, 167, 168, 169	Evaluated in RVN. LP buy in excess of $1X10^6$ supplied by MUCOM to USARV. DA stated no requirement.
Non-Submersible Smoke Grenade	USARAL recommends TC STD. ROC being prepared.
Oxygen Breathing Apparatus	Supplied to Northern Warfare Training School. TC recommended. Information transferred to TSG for follow-up.
Passive Transponder	Evaluated by MASSTER. Recommended modification. Information transferred to ECOM for follow-up.
Personnel Detector (Ma.pack)	QRL qty of 200 provided by LWL to USARV.

TITLE	REMARKS
Portable Sign Making Kit	To be basis for new ROC. Parent Agency (NLABS) to type classify.
Position Marker PM-4	Evaluation of 400 supplied to ACTIV by LWL.
Public Address Set, AN/UIQ-10	LP buy by Marine Corps.
Radar Intrusion Detector	Capability requirement added to ROC. Being validated by ACSFOR. MP Agency evaluated item supplied by LWL.
Rappelling Attachment for HC-34	Supplied to MACSOG by LWL. Recommended that it be added to CH-34 as MWO.
Reduced Size Aerial Reconnaissance Platform	Evaluated by Army Security Agency and Electronic Warfare Laboratories. AVSCOM assigned by AMC for follow-up action.
Remote Area Refrigerator	MACV recommended TC. ROC being reviewed by TRADOC. No present requirement.
Remote Boat	Evaluation qty of 24 supplied to MACSOG by LWL.
Replacement Mine Detection/Dog	Two Platoons trained by LWL and supplied to USARV.
Retransmission System	Evaluation qty of 6 supplied to ARVN and USARV which recommended TC with modification.
Riot Control Patrol Vehicle	Evaluation qty of 5 supplied to 1st Army by LWL. Draft MN being prepared.
Sandbag Bunker Kit	Supplied to ARVN. Also evaluated by USARV which recommended TC STD after further development.
Scratch Resistant Plastic Windows for M151	Production change being considered (MWO).
Searchlight for M113 APC	Evaluation qty of 6 supplied to [illegible]. Operational qty provided ARVN thru [illegible] MAP.
Shotshell Adapter for M79 Launcher	Evaluation qty of [illegible] supplied by LWL to USARV. QRL qty of 100 for USAR supplied by WECOM.
Silenced Pistols and Rifles	Supplied to MACSOG by LWL.

TITLE	REMARKS
Simple Bell Mine	LWL supplied qty of 50 to USMC as dog training device.
Small Arms Protection for Vehicles	Evaluation qty of 20 supplied USARV by LWL. ENSURE qty of 100 provided by TACOM to USARV.
Smoke Screen Troop Landing	LWL supplied qty of 6 to USARV. QRL qty of 30 for USARV supplied by MICOM.
Snow Stabilization Technique	TRADOC will incorporate into FM's & TM's.
Sten Guns Modified	Supplied to MACSOG by LWL for operational use.
Sub-Assemblies, Airborne Personnel Detector	LWL supplied 22 systems to USARV.
Tagging Kit for Identification and Detection of US Government Owned Petroleum Products	Item listed in TB 703-2 dtd 29 Nov 72. Evaluated in RVN and Korea.
Target Marker, 40mm (Floating) TMT-1	ENSURE qty of 100 supplied to USARV by LWL for evaluation. Added to MN for signals, 40mm Ground Weapon Launched.
Two-Component Chemiluminescent System	ROC with supporting data submitted to ACSFOR.
Two-Man Tent	ROC drafted by TRADOC Infantry Agency. Now withdrawn.
Underwater Target Detector	ROC in preparation by TRADOC.
USMC Mine Detector/Dog Handler Team	LWL trained 4 teams and supplied to USMC.
USOM Scout Vehicle Armor Kit	LWL supplied 100 kits to USAID, RVN.
Vehicular Navigation System	Under evaluation by MASSTER.
Walk Through Ferrous Metal Detection Station	Evaluated by Office of Provost Marshal, USARV.
Waterproofing Kit for H189-U Hand Set	AMC will issue MWO to make part of Hand Set.
Waterproof Notebook	Evaluation of 1000 supplied to USARV by LWL. FSN assigned. Will be made available to troops by Natick.
Weather Kit	Supplied to USAREUR, USARAL, RVN.
XR-311 Vehicle	TECMAT item. ROC forwarded to DA. Not yet approved.